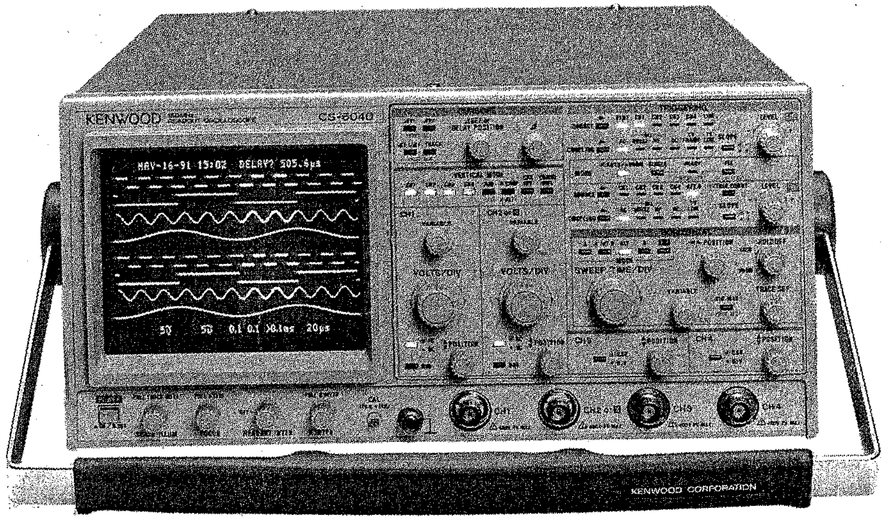
KENWOOD

150MHz READOUT OSCILLOSCOPE

CS-6040

SERVICE MANUAL

KENWOOD CORPORATION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WARNING

The following instructions are for use by qualified personnel only. To avoid electric shock, do not perform any servicing other than contained in the operating instructions unless you are qualified to do so.

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SPECIFICATIONS

CRT		150 mm rectangular with internal graticule
Acceleration Voltage		20 kV
Display Area		8 × 10 div (1 div = 10 mm)
VERTICAL AXIS (CH1 and CH2)		
Sensitivity		5 mV/div to 5 V/div ±2% (10 °C to 35 °C) 1 mV/div to 2 V/div ±4% (10 °C to 35 °C)
Attenuator		12 steps, 1 mV/div to 5 V/div in 1-2-5 sequence Vernier control for fully adjustable sensitivity between steps
Input Impedance		1 MΩ ±1%, 20 pF ±3 pF
Frequency Response		
	5 mV/div to 5 V/div	DC; DC to 150 MHz, within −3 dB AC; 5 Hz to 150 MHz, within −3 dB
	1 mV/div, 2 mV/div	DC; DC to 20 MHz, within −3 dB AC; 5 Hz to 20 MHz, within −3 dB
Rise Time		2.3 ns or less (5 mV/div to 5 V/div) 17.5 ns or less (1 mV/div, 2 mV/div)
Signal Delay Time		More than 10 ns on the CRT screen
Crosstalk		−40 dB or less (at 1 kHz)
Operating Modes	CH1	CH1 single trace display, and dual to quad trace display in combination with other channel (s)
	CH2	CH2 single trace display, and dual to quad trace display in combination with other channel (s)
	CH3	CH3 single trace display, and dual to quad trace display in combination with other channel (s)
	CH4	CH4 single trace display, and dual to quad trace display in combination with other channel (s)
	ADD	CH1 + (±CH2) added display, and dual to quad trace display in combination with other channel (s)
	ALT	Dual to quad trace alternating
	CHOP	Dual to quad trace chopped
Channel Polarity		Normal or inverted, channel 2 only inverted
Bandwidth Limiting		Approx. 20 MHz
Chop Frequency		Approx. 500 kHz
Delay Time Difference		CH1 to CH2 ; 0.5 ns or less CH1, CH2 to CH3, CH4 ; 1 ns or less
Non-distorted Maximum Amplitude		More than 8 div (DC to 150 MHz)
⚠ Maximum Input Voltage		800 Vp-p or 400 V (DC + AC peak)
VERTICAL AXIS (CH3 and CH4)		
Sensitivity		0.1 V/div, 0.5 V/div, ±2% (10 °C to 35 °C)
Input Impedance		1 MΩ ±1%, 20 pF ±3 pF
Coupling Method		DC coupling
Frequency Response		DC to 150 MHz, within −3 dB
Rise Time		2.3 ns or less (at 150 MHz)
⚠ Maximum Input Voltage		800 Vp-p or 400 V (DC + AC peak)
HORIZONTAL AXIS (Input thru CH2)		
Operating Modes		With HORIZ. MODE switch, X-Y operation is selectable CH1 to CH4 and ADD ; Y axis CH2 ; X axis
Sensitivity		Same as vertical axis (CH2)
Input Impedance		Same as vertical axis (CH2)
Frequency Response	DC	DC to 2 MHz, within −3 dB
	AC	5 Hz to 2 MHz, within −3 dB
X-Y Phase Difference		3° or less at 100 kHz
⚠ Maximum Input Voltage		Same as vertical axis (CH2)

SPECIFICATIONS

SWEEP		
Type	A	A sweep
	A INT B	B sweep waveform is displayed as an intensified portion of the A sweep.
	ALT	A sweep (intensified for duration of B sweep) and B sweep (delayed sweep) alternating
	B	B sweep
	X-Y	X-Y oscilloscope
Sweep Time	A	20 ns/div to 0.5 s/div, ±2% (10 °C to 35 °C), in 23 ranges, in 1-2-5 sequence Vernier control provides fully adjustable sweep time all ranges.
	B	20 ns/div to 5 ms/div, ±2% (10 °C to 35 °C), in 20 ranges, in 1-2-5 sequence
Sweep Magnification		×10 (ten times) ±5% (A and B)
Linearity		20 ns/div to 0.5 s/div : ±3% (±5%, at ×10 MAG)
Holdoff		Continuously variable for A sweep from NORM to more than five times
Trace Separation		B sweep can be separated from A sweep up to 4 divisions downward, continuously adjustable.
Delay Method		Continuous delay, Trigger delay and Trigger count
Delay Time		Continuous delay, Trigger delay ; 0.2 to 10 times of A SWEEP TIME/DIV set value (5,000 count fullscale)
Trigger Count		1 to 2,000 count, Max. usable frequency: 10 MHz
Delay Accuracy		±(2% of set value +1% of fullscale)+(0 to 100 ns)
Delay Jitter		1/20,000
TRIGGERING		
A Trigger Modes		AUTO, NORM, SINGLE, FIX
A Trigger Source	V. MODE	Triggered by input signal selected with VERTICAL MODE selector
	CH1	Triggered by CH1 vertical axis input signal
	CH2	Triggered by CH2 vertical axis input signal
	CH3	Triggered by CH3 vertical axis input signal
	CH4	Triggered by CH4 vertical axis input signal
	LINE	Triggered by line frequency
A Trigger Coupling		AC, NOISEREJ, HFREJ, DC, TV FRAME, (In TV COUNT mode, enables switching getween FLD1/FLD2 and 525/625 lines.), TV LINE
A Trigger Level		±90 ° adjustable
A Trigger Polarity		+/−
B Trigger Modes		Sterts After Delay, B Triggerable After Delay and TRIG COUNT
B Trigger Source	CH1	Triggered by CH1 vertical axis input signal
	CH2	Triggered by CH2 vertical axis input signal
	CH3	Triggered by CH3 vertical axis input signal
	CH4	Triggered by CH4 vertical axis input signal
B Trigger Coupling		AC, NOISEREJ, HFREJ, DC, TV LINE
B Trigger Level		±90 ° adjustable
B Trigger Polarity		+/−

SPECIFICATIONS

Trigger Sensitivity	COUPLING	FREQUENCY RANGE	MINIMUM SYNC AMPLITUDE
	DC	DC to 50 MHz/DC to 150 MHz	1 div/1.5 div
	AC	20 Hz to 50 MHz/20 Hz to 150 MHz	1 div/1.5 div
	NOISEREJ	Two times of minimum sync amplitude.	
	HFREJ	Increased minimum sync amplitude for above 30 kHz.	
	TV FRAME	1 div (140 IRE)	
	TV LINE	1 div (140 IRE)	
	AUTO: Same as above specification for above 50 Hz	FIX: Same as above specification for above 40 Hz.	
Jitter		0.5 ns or less at 150 MHz at 2 ns/div sweep rate (× 10 MAG on)	
INTENSITY MODULATION			
Sensitivity		+ 5 V, Negative voltage increases brightness, positive voltage decreases brightness	
Input Impedance		Approx. 10 kΩ	
Usable Frequency Range		DC to 10 MHz	
⚠ Maximum Input Voltage		50 V (DC + AC peak)	
VERTICAL AXIS OUTPUT (CH1 only)			
Output voltage		Approx. 50 mVp-p/div (into 50 Ω load)	
Output Impedance		Approx. 50 Ω	
Frequency Response		100 Hz to 150 MHz, within − 3 dB (at into 50 Ω)	
TRACE ROTATION		Electrical, adjustable from front panel	
CALIBRATION VOLTAGE		1 V p-p ± 1%, Positive square wave, 1 kHz ± 3%	
READOUT			
Calendar		Year/Month/Day/O'clock/Minute Clock accuracy; ± 2 min./month Battery life: About 30,000 hours (at room temperature)	
Set Value		CH1 − CH4 scale factor (with probe detection), GND, AC/DC, V-UNCAL, ADD, INVERT, BW, A and B sweep scale factor (magnification conversion), SWEEP VERIABLE UNCAL, X-Y (CH2-X), DELAY TIME, TRIG COUNT, TV COUNT	
Cursor Mode	ΔV1	Voltage difference between ΔREF and Δcursors on a CH1 scale factor basis	
	ΔV2	Voltage difference between ΔREF and Δcursors on a CH2 scale factor basis	
	ΔT	Time difference between ΔREF and Δcursors on the basis of sweep scale factor	
	1/ΔT	Frequency between ΔREF and Δcursors on the basis of sweep scale factor	
		RATIO: Voltage ratio and time ratio between ΔREF and Δcursors, supposing 5-division on the CRT as 100%	
		PHASE: Phase difference between ΔREF and Δcursors, supposing 5-division on the CRT as 360°	
Cursor Measurement	Resolution	10 bits	
	Measurement accuracy	± 3%	
	Measurement range	Vertical direction: ± 3.6 div or more from the CRT center Horizontal direction: ± 4.6 div or more from the CRT center	

SPECIFICATIONS

PROGRAM MODE			
Programming capacity			20 steps × 5 blocks
Programmable parameters	CURSORS	CURSOR MODE	ΔV1, ΔV2, ΔT, 1/ΔT, TRACKING
		CURSOR	ΔREF, Δ
	VERTICAL	VERTICAL MODE	CH1, CH2, CH3, ADD, CHOP, ALT, CH2 INV, 20 MHz BWL
		ALT	CH1, CH2, CH3, CH4
		ACC, DC, GND	CH1, CH2
	HORIZONTAL	HORIZONTAL MODE	A, A INT B, ALT, B, X-Y
		SWEEP TIME	A, B
	TRIGGERING	A SOURCE	VERT, CH1, CH2, CH3, CH4, LINE
		A COUPLE	AC, NOISEREJ, HFREJ, DC, TV FRAME (TV COUNT FLD1/FLD2), TV LINE
		A SLOPE	+/−
		B SLOPE	CH1, CH2, CH3, CH4, TRIG DELAY, AFT DELAY, TRIG COUNT
		B COUPLE	AC, NOISEREJ, HFREJ, DC, TV LINE
		B SLOPE	+/−
	SWEEP MODE		AUTO, NORM, SINGLE, FIX
Program Step Input	Input voltage		"H" (above 3.2 V), "L" (0.5 V or less), setting to "L" advances count one step
	Input impedance		Approx. 10 kΩ
	Maximum input voltage		50 V (DC+AC peak)
POWER REQUIREMENT			
Line Voltage			100 V/120 V/220 V/240 V AC ±10%
Line Frequency			50/60 Hz
Power Consumption			73 W
DIMENSIONS (W×H×D)			310 (332)×150 (163)×400 (448) mm ( ) dimensions include protrusion from basic outline dimensions
WEIGHT			Approx. 9 kg
ENVIRONMENTAL			
Within Specifications			10°C to 35°C, 85% max. relative humidity
Full Operation			0°C to 40°C, 85% max. relative humidity
ACCESSORIES SUPPLIED			
Probe			PC-31 (READOUT compatible probe)×2 Attenuation...............1/10 Input impedance........10 MΩ ±1%, 14 pF ±10%
Replacement Fuse			1.2 A×2, 0.8 A×2
Instruction Manual			1

* Circuit and rating are subject to change without notice due to developments in technology.

SAFETY

SAFETY

Before connecting the instrument to a power source, carefully read the following information, then verify that the proper power cord is used and the proper line fuse is installed for power source. The specified voltage is shown at the fuse holder of the AC inlet. If the power cord is not applied for specified voltage, there is always a certain amount of danger from electric shock.

Line voltage

This instrument operates using ac-power input voltages that 100/120/220/240 V at frequencies from 50 Hz to 60 Hz.

Power cord

The ground wire of the 3-wire ac power plug places the chassis and housing of the oscilloscope at earth ground. Do not attempt to defeat the ground wire connection or float the oscilloscope; to do so may pose a great safety hazard. The appropriate power cord is supplied by an option that is specified when the instrument is ordered.
The optional power cords are shown as follows in Fig. 1.

Line fuse

The fuse holder is located on the rear panel and contains the line fuse. Verify that the proper fuse is installed by replacing the line fuse.

Voltage conversion

This oscilloscope may be operated from either a 100 V to 240 V, 50/60 Hz power source. Use the following procedure to change from 100 to 240 volt operation or vice versa.

1. Remove the fuse holder.
2. Replace fuse F 1 with a fuse of appropriate value, 1.2 amp for 100 VAC to 120 VAC operation, 0.8 amp for 220 VAC to 240 VAC operation.
3. Reinsert it for appropriate voltage range.
4. When performing the reinsertion of fuse holder for the voltage conversion, the appropriate power cord should be used. (See Fig. 1.)

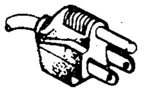
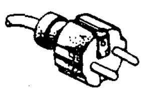
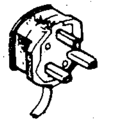
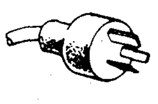
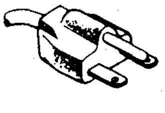
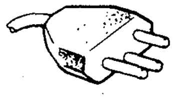
Plug configuration	Power cord and plug type	Factory installed instrument fuse	Line cord plug fuse	Parts No. for power cord and plate
	North American 120 volt/60 Hz Rated 15 amp (12 amp max; NEC)	1.2 A, 250 V Fast blow 6×30 mm	None	Cord: E30-1820-05
	Universal Europe 220 volt/50 Hz Rated 16 amp	North Europe 0.8 A, 250 V Slow blow 5×20 mm Other Europe 0.8 A, 250 V Fast blow 6×30 mm	None	Cord: E30-1819-05
	U.K. 240 volt/50 Hz Rated 13 amp	0.8 A, 250 V Fast blow 6×30 mm	0.8 A Type C	—
	Australian 240 volt/50 Hz Rated 10 amp	0.8 A, 250 V Fast blow 6×30 mm	None	Cord: E30-1821-05
	North American 240 volt/60 Hz Rated 15 amp (12 amp max; NEC)	0.8 A, 250 V Fast blow 6×30 mm	None	—
	Switzerland 240 volt/50 Hz Rated 10 amp	0.8 A, 250 V Fast blow 6×30 mm	None	—

Fig. 1 Power Input Voltage Configuration

CIRCUIT DESCRIPTION

Vertical Attenuator Circuit (X75-1180-01)

The attenuators for channel 1 and channel 2 are operated by the signals from the panel, and AC/DC/GND input coupling and attenuation of 1/1, 1/10, and 1/100 are switched.

The vertical input signal from the BNC input terminal passes through the attenuator and is input to the buffer amp formed by U101 and Q101 (CH2: U201 and Q201). U101 is a source follower and constant current supply and Q101 is for input protection. The input signal is impedance converted by these components and is input to the 1st amp formed by U102 and Q102 (CH2: U202, Q202). A differential signal is created here, and the 1st amp for channel 2 contains an INV circuit that switches the inversion transistor ON/OFF using the data from the R/O unit.

U1 and U2 produce a voltage signal from the serial data from the R/O unit, and this serial data is converted to a 0/5 V parallel signal. Although inversion is not possible on the channel 1 side, the same circuit as the channel 2 circuit is used for circuit stability, and the bias of the inversion transistor is fixed at the off state. The channels 1 and 2 input signals are input to the vertical preamp unit after passing through the 1st amp.

The channels 3 and 4 input signals are input to the 1/1 or 1/5 attenuator as selected by the K301 (CH4 : K401) relay. The signal is then input to the buffer amp formed by Q301 and 302 (CH4: Q401, 402). Q301 is a source follower, Q302 is a constant current supply, and Q303 is for input protection. The signal is impedance converted by this amp. The signal is then input to the 1st amp formed by Q304 and 305 (CH4: Q404, 405). This amplifier produces a differential signal. The channel 3 and channel 4 signals are input to the vertical preamp unit after passing through the 1st amp.

Switch Unit (X69-1150-02)

*** Switch Matrix**

All the tact switches on the panel form a switch matrix. Pins 1, 2, 3, 4, and 15 of U9 are all low when a tact switch is not pressed, and the output (D0 to D7) is at +5 V.

When a switch is pressed, the output of the switch (one of D0 through D7) goes to low due to Pin 15, 1, 2, 3, or 4 of U9 going to low. The output from D0 through D7 is connected to the R/O unit, and when any of these outputs goes to low, an interrupt is applied to the CPU and serial data is sent to U9. U9 which receives data from the R/O unit, first switches all of Pins 15, 1, 2, 3, and 4 to high and then switches each pin to low. The resulting voltage from the output (D0 to D7) is used to determine which switch was pressed.

*** Panel LED**

The corresponding LEDs on the panel are illuminated when Pins 15 and 1 through 7 of U2 through U8 go from high to low. Serial data from the R/O unit is sent to U2 through U8, and the LED to be illuminated is selected according to that signal.

*** Rotary Encoder**

Rotary encoders are used for the VOLTS/DIV and SWEEP TIME controls for channel 1 and channel 2. The data from these encoders is received by the R/O unit. Refer to the section on the R/O unit regarding operation.

Panel Unit (X66-1050-01)

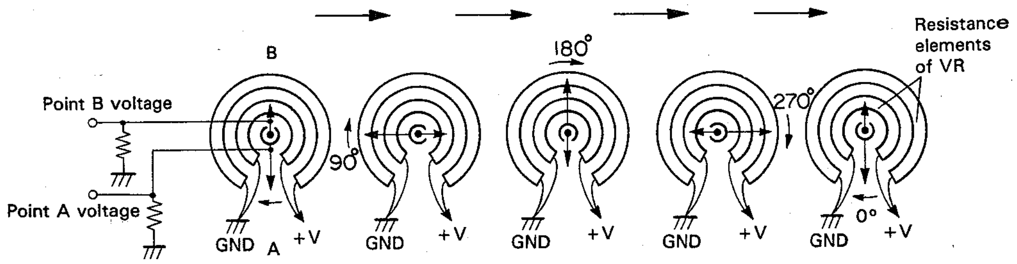
*** VR (VR1 to 10), Uncal Search**

Variable resistors (VR) are used for setting the position, V-variable, trig level, hold off, and T-sep for each channel. Both terminals of each of the VRs are connected to +/− 10 V, +10 V and GND, or +5 V and GND, and the set voltage is sent to the various units.

The collector of Q1, 2 (CH1) or Q3, 4 (CH2) goes from 0 V to approximately +5 V when V-VARIABLE is set to the UNCAL state, voltage is supplied to the R/O unit, and the UNCAL mark (●) appears on the screen.

*** Comparator, Endless VR**

Endless VRs are used in four locations: horizontal position, Δ, and Δ REF. As shown in Fig. 1, two resistance elements are used alternately for this operation. The output voltage is received by the R/O unit. U1a supplies stable voltage to each terminal of the endless VRs.



CIRCUIT DESCRIPTION

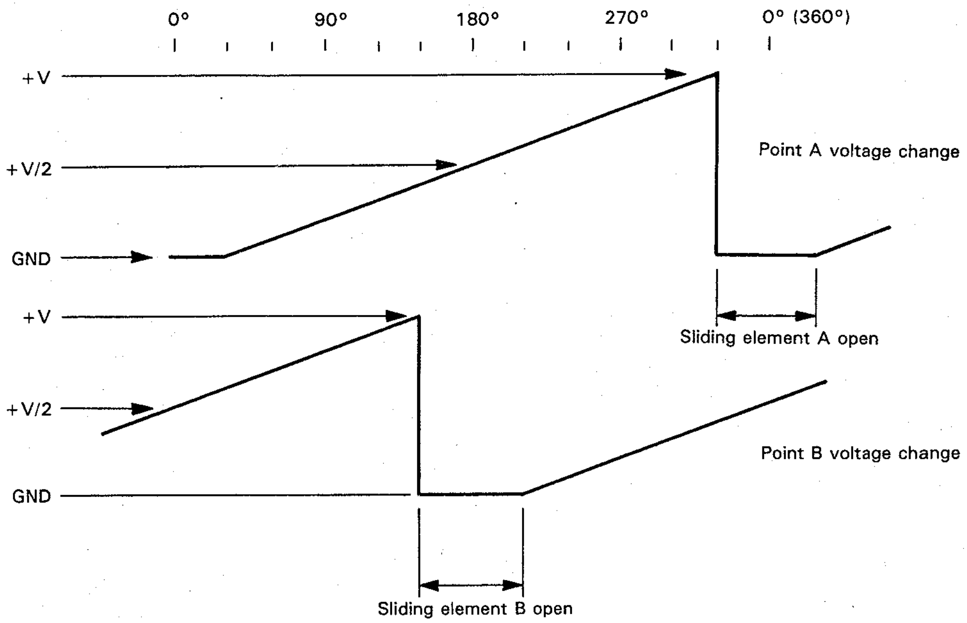


Fig. 1 Endless VR Operation

High Voltage Unit (X68-1510-02)

∗ Blanking Circuit

This is a circuit for amplifying the blanking signal from the horizontal unit. The signal input from P19 passes through the Q8 emitter follower, and is input to Q6 for amplification. Q5 is a constant current supply for Q6 and Q7 is a transistor for absorbing current. Negative feedback is applied to this by R26, and the degree of amplification is determined by R26 and R358 of the horizontal unit. The blanking signal amplified to high voltage is then applied to G1 of the CRT from the high voltage oscillation circuit (described below) using D8 through D10. The G1 potential from K (cathode) is set a low level, and the brightness decreases as this level decreases.

The voltage of the blanking signal of the horizontal unit is altered according to the INT VR of the VR unit, altering the brightness which results.

The output from Q6, ie., the amplified blanking signal, is input to Q4. The brightness is altered by the auto-focus so that the focus point is not lost.

Q3 is a constant current supply for Q4. The signal is then overlapped with the high voltage level using D4 through 7, in the same manner, and the resulting signal is applied to the P1 terminal of the CRT after the potential is controlled by VR23 of the VR unit.

∗ High Voltage Oscillation Circuit

Oscillation at 30 kHz is invoked by Q1, and becomes high voltage by the high voltage block. U1 and Q2 provide negative feedback for control.

Power Supply Unit (X68-1500-01)

The power supply circuits are composed of six regulated output systems (+5, +/−10, +15, +60, and +140 V) and two unregulated systems (+/−13 V).

The regulated outputs are all with reference to −10 V. This −10 V output uses a 5 V Zener diode (D5) as reference, and is obtained by the drive transistor (Q6) and op amp U3. Other regulated output is obtained using op amps (U1, 2, and 3) and transistors (Q1, 3, 5, 6, 7, and 8), with this −10 V output as reference.

The unregulated output of +/−13 V uses the voltage before regulation to obtain regulated output of +/−10 V.

VR Unit (X81-2330-02)

∗ Calibration Voltage Generation Circuit

Op amp U1 is used as an oscillator, and the DC voltage is switched using D1 to generate a 1kHz square wave.

∗ Scale Illumination Circuit

This circuit drives an illumination lamp with the Q6 emitter follower as an output stage. D4 and 5 are used for switching to provide one-shot illumination.

∗ Trace Rotation Circuit

This circuit drives a coil for rotation by the Q2 and 3 emitter followers.

∗ Intensity Circuit

This circuit has three 20kB VRs, A SWEEP, B SWEEP, and R/O, both ends are connected to +/−10 V, and the set voltage is sent to the horizontal unit to create a blanking signal. The R/O VR is equipped with an ON/OFF switch.

CIRCUIT DESCRIPTION

Final Unit (X80-1100-02)

* Vertical Amplification System — Vertical Final Preamp to Vertical R/O Switching to Vertical Final Amp

The signal output from the vertical preamp unit and which passed through the delay line, is input to the vertical amplification system of the final unit. The signal first passes through the Q1 and Q2 emitter followers, and is input to Q3 and Q4 for amplification. Q203 and 204 alternately select Q3 and Q4 that amplify the waveform for output of characters on the CRT screen by the R/O function and Q201 and Q202 which amplify the character information sent from the R/O unit. When the ROREQ signal from the R/O unit is high, Q204 is switched ON, Q3 and 4 are switched ON, Q203 is switched OFF, and Q201 and 202 are switched OFF. The signal is amplified and the character information is not input. When the ROREQ signal is low, the opposite occurs, and the character information is amplified without signal input. The signal then enters the Q5 and 6 base grounded amp, is impedance converted by the Q7 and 8 emitter follower, is input to the final amp formed by Q9, 10, 13, 11, 12, and 14, and is input to the deflection plate of the CRT.

* Horizontal Amplification System — Horizontal Final Preamp to Horizontal R/O Switching to Horizontal Final Amp

The signal sent from the horizontal unit is input to the Q101, 102 base grounded amp, and is amplified by Q103, 104 after passing through D101, 102, 105 and 106 for excessive input limiting. In the same manner as the vertical system, Q208, 209 switches between the amp for signal formed by Q103, 104 and the amp for characters formed by Q206, 207.

Following this, the signal is input to the Q105, 106 base grounded amp, is impedance converted by the Q107, 108 emitter follower, is amplified by Q109, 110, is impedance converted by the Q112, 113 emitter follower, and is input to the Q114, 115 amp. Q116, 117 form a constant current supply to supply a fixed current level to Q114, 115. Negative feedback is applied to the output by R114, 145, 153, and 154, and the degree of amplification is determined by R144, 145, 153, 154 and R152, 133. This configuration provides stability and allows for amplification with high amplitude.

Vertical Preamp Unit (X73-1760-01)

The channel 1 and channel 2 signal output from the ATT unit enter the vertical preamp unit and are first input to the buffer amp formed by Q101 (CH2: Q201). The signals are then input to the X5 and X1 amps. The X5 amp is formed by Q102 (CH2: Q202) and the X1 amp by Q103 and 104 (CH2: Q203, 204). Switching between the amps is by Q105 and 106. When Q105 is ON, Q106 is OFF and the X5 amp is selected. When Q106 is ON, Q105 is OFF and the X1 amp is selected. The signal which passed through Q108, 109 (CH2: Q208, 209) cascade connected to Q102, 103, 104 (CH2: Q202, 203, 204) is input to the 1/1, 1/2, or 1/4 ATT, switched by the K101 (CH2: K201) relay. The signal emerging from the ATT is impedance converted by Q112, 113 (CH2: Q21, 213), and input to Q114, 115 (CH2: Q214, 215). There is a vertical variable circuit formed by R169, 170, U102 (CH2: R269, 270, U201) between the cascade connections. This circuit applies the DC signal for variable control sent from the panel by U101 (CH2: U201) connections. This circuit applies the DC signal for variable control, sent from the panel by U101 (CH2: U201) and varies the gain by varying the impedance of HIC U102 (CH2: U202). The CH1 and CH2 signals emerging from the cascade amp that forms the 3rd amp are impedance converted by the buffer amp formed by Q119, 120 (CH2: 219, 220), and input to the amp for trig signal output (formed by Q601 to 604), Q528 and 529 cascade connected to Q501 and 502. Between the cascode amps, there is an amp for POSI variation by Q503, Q504 (CH2: Q507, 508) and a CH selection circuit formed by Q1 and 2 (CH2: Q3, 4). Although the trigger signal output amp is a balanced circuit using Q601 and 602 (CH2: 605, 606), only Q601 (CH2: Q605) actually extracts the trigger signal, and this component is cascode connected to Q603 (CH2: Q607). Subsequent explanation on this trigger amp will be given below.

* CH3 and 4 3rd Amp to Select SW

Q301 and 302 (CH4: Q401, 402) are cascode connected to Q304 and 305 (CH4: 404, 405) of the attenuator unit, and there are resistors and capacitors for gain control and frequency response correction between them. The signal emerging from the cascode amp enters the buffer amp formed by Q304, 305 (CH4: Q404, 405), is impedance converted, and input to the 1st trig amp.

The input to the trig amp is approximately 50% of the output from the 3rd amp, and a balance circuit is formed by Q609 and 610 (CH4: Q613, 614) for balancing. However, the signal extracted as the trigger signal is actually only the signal from the Q609 side (CH4: Q613). Subsequent explanation on this trigger amp will be given below.

The signal output from the 3rd amp will be input to the trig amp and V. mode select switch. This is formed by Q509, 510 (CH4: Q513, 514) and Q5, 6 (CH4: Q7, 8). When the V. mode is selected, Q5, 6 (CH4: Q7, 8) are OFF, and the signal passes through D505, 506 (CH4: D507, 508), and is input to the mix amp. When this mode is not selected, Q5, 6 (CH4: Q7, 8) are ON, and the signal is canceled. This operation is the same for channels 1 and 2. Q511, 512 (CH4: Q515, 516) between Q509, 510 (CH4: Q513, 514) and Q5, 6 (CH4: Q7, 8) form a POSI variable amp that changes the bias of Q512 (CH4: Q516) to vary the position, according to the DC voltage from the panel.

* Mix Amp to 4-ch Amp to T. SEP Amp to 20 MHz BW SW

The signals that passed through the select switches for the various channels and diodes D501 through 508, are input to the mix amp formed by Q528, 529. Q518 is ON when ADD is selected in the V. mode. The impedance of the signal is then converted by the buffer amp formed by Q519, 520, and input to the T. SEP amp formed by Q522 and 523. In this T. SEP amp, the B SWEEP position is altered by input of a control signal to the base of Q523 for switching so that the amp only operates by the B sweep signal.

The impedance of the signal which passed through the T. SEP amp is converted by the buffer amp formed by Q524, 525, and the signal is input to the delay line. A switch for performing 20 MHz BW is formed by Q526, 527, a low-pass filter is formed by C509, 510, and the circuit functions as a 20 MHz BW. The signal then passes through a delay line and is input to the final unit.

∗ 1st Trig Amp — Trig Select — 2nd Trig Amp

The trigger signal extracted by Q601 and 602 (CH1), Q605 and 606 (CH2), Q609 and 610 (CH3), and Q613 and 614 (CH4) is input to the amps formed by Q603 and 604 (CH1), Q607 and 608 (CH2), Q611 and 612 (CH3), and Q615 and 616 (CH4). It is then input to trig select after impedance conversion. At this time, a portion of the channel 1 signal is split to the CH1 out amp formed by Q621 and 622, and a portion of the channel 2 passes through Q620 and becomes the X signal for the X-Y mode.

Trig select is a switch formed by D601, 602, 603, and Q623 to 621. When the various transistors are switched on by the CH select logic signal, the diode connected to the transistor has reverse polarity and goes off. The diode can be switched on by switching the transistor off, and the trigger signal will be output to the amp in the next stage. D601 receives the A trig, D602 receives the B trig, and D603 receives the line trig.

The trigger signal received by trig select is impedance converted by the 2nd trig amp formed by Q617 and 632 (A trig) and Q618 and 633 (B trig), and is then sent to the horizontal unit.

∗ Control of vertical preamp unit

The following signals are sent from the R/O unit for control of the vertical preamp unit.

(1) Serial data .... this signal is sent from the R/O unit together with the clock signal, and input to U1, U2, U3, U4, U5, U6, U7, and U8 for conversion to parallel data. The following are controlled by this signal:
  - X1 and X5 amp switching
  - 1/1, 1/2, 1/4 ATT switching
  - V-MODE switching
  - 20 MHz BW limit
  - Trigger signal selection

(2) Voltage supplied directly from panel .... voltage between 0 V and 10 V is created by the variable resistors on the panel, and is input as a signal to the vertical preamp unit through the R/O unit.
  - POSI variation
  - V-VAR

The above are the signals externally input for control.

Horizontal Unit (X74-1480-02)

The trigger signals (ATR, BTR signal) supplied from the vertical preamp unit (X73-1760-01) are input to the trig preamps. The A trig preamp is formed from Q1 and Q2, etc., and the B trig preamp is formed from Q14 and Q15, etc. When a TV signal is input, TV coupling is selected to amplify the TV sync signal. The control signal to perform this is output from U29, and the gain of Q1 and Q14 is changed by switching with Q9 to correspond to the TV sync signal. The trigger level is altered after the signal passes through the trig preamp. The trigger level of A-sweep is altered by U21 and the level of B-sweep by U22. The level is switched by the U16 analog switch by panel switch operation, and the FIX signal, TV signal, and A BLVL signal are selected.

The input signal with trigger level altered is input to the trig amp formed by Q5, Q6, Q7 and Q17, Q18, and Q19. When coupling is set to HFREJ by operation of the panel switch, a control signal is output from U29, Q8 or Q20 is switched on, and the high frequency components are attenuated. The signal is input to the Schmitt circuit formed by U1 or U2 after passing through the trig amp. The hysteresis width of the Schmitt circuit is altered by the noise rejection control signal output from U29, allowing stable triggering even for input signals containing noise. The control signal output from U30 determines whether the slope is positive or negative.

The signal output from the A-sweep Schmitt circuit is input to the auto freerun circuit formed by Q103 and Q104 to control U39 according to the auto or normal mode. This sets the unit to the sweep mode or trigger standby mode.

The AS signal output from Q of U3a is input to Q109 of the A-sweep circuit, performing start and stop control of the A-sweep. U24b in the A-sweep circuit takes the analog voltage supplied from U101 unit and amplifies it to 5 V at range 1, 2.5 V at range 2, and 1 V at range 5. The current is determined by this voltage and the aggregate resistance selected by the U17 analog switch. This determines the sweep time.

The AS signal output from Q of U3a and the BS signal output from Q of U3b are input to the blanking circuit formed by U4, the UNBL signal is generated from ROUBL, ROINT, BINT, AINT, etc., and supplied to the high voltage unit (X68-1500-01).

In the same manner as the A-sweep circuit, U26d in the B-sweep circuit amplifies the analog voltage fed from the R/O unit, and determines the current by the U18 analog switch to determine the sweep time.

The A-sweep signal output from Q116 and the B-sweep signal output from Q134 are input to the mix amp formed by U19, Q302, Q303, Q304, Q306, and Q307. In this circuit, the analog voltage supplied from X10 MAG and the R/O unit are amplified by U27, and H-POSI control is performed. The signals output from this circuit are fed to the final unit (X80-1100-01) as the X+ and X- signals.

Switching between A-sweep and B-sweep is controlled by U7, and this signal is sent to the mix amp and blanking circuit. The switching signal for chopping of A-sweep and B-sweep is generated by the circuit formed by Q403 and Q404. The chop frequency at this time is 500 kHz.

Delayed sweep is performed by comparing the voltage of the A-sweep output from Q116 and the DTP signal supplied from the R/O unit by the delay comparator formed by Q102, U25, etc, and the position to start the B-sweep is determined. The signal to start the B-sweep at this time is input to the logic circuit for B-sweep formed by U13a, b, c, and U6, and the signal to output the BS signal is sent to U3b.

In the single sweep mode, the SGL signal supplied from the R/O unit is input to the A-sweep logic circuit formed by U11b, U12d, and U5, and the A-sweep trigger standby mode is selected when the RESET signal is input.

There is also a 1-shot ILLM circuit which illuminates a lamp for approximately 1 second when the single sweep is completed. This circuit is formed from U12, Q405, Q406, C405, and C406, etc.

CIRCUIT DESCRIPTION

Readout unit (X77-1490-01)

The R/O unit contains an 8-bit Z-80A CPU, and has two major functions: control of the operation of the various sections and the output of CRT character information.

The basic clock which forms the basis for the timing of all IC operations is generated by the 10 MHz oscillator formed by U11d and X1. The 10 MHz CLK is used for operation of U33 (R/O controller), and this clock signal is divided to 1/4 by U10 to create the 2.5 MHz CLK. This clock signal is used for operation of the U5 CPU (Z-80A) and as a control signal for sending data and addresses to U33.

Changes in information from the switch unit (X69-1150-02) and the timing, clock, and soft timers for the CRT display are all realized through interrupts which are sent to the CPU. Changes at the switch unit include interrupts issued when a pushbutton switch is pressed and when the rotary encoders used for VOLTS/DIV and SWEEP/DIV are rotated. When a switched is pressed, one of lines D0 through D7 of U24 connected as a data bus for switch information goes to "L". U14e goes to "L" causing Q of U21a to also go to "L", notifying the CPU that a switch position has been changed. When CRT information is changed by operation of the switches or variable resistors on the panel, the timing for updating the CRT indication is output every 13.5 μs from U33. The change is latched to U21a, and indicated to the CPU as an interrupt. The CPU recognizes this interrupt and performs processing to update the CRT indication.

U12, U13, U17, and U18 form the import section which outputs the data decoded by U6 and U8 to the data bus. U12 is an import IC for evaluating the probe detection (1/1 to 1/10), battery capacity, and status of the CH1 and CH2 variables. Probe detection and variable status is fetched by the CPU approximately every 15 μs, and evaluated and processing performed. The B1 battery capacity is monitored by U46a, and when the level drops below approximately 2.4 V, the status (H level) is fetched from the import at POWER ON, and "BATT DOWN" is displayed on the CRT screen.

U13 is an import IC for interrupt evaluation, and it determines whether an interrupt such as rotary encoder (CH1, CH2, SWEEP), 2 ms, clock, switch, or CRT indication has been transmitted to the CPU.

U17 receives the A-phase and B-phase status of the rotary encoder, receives and evaluates the movement of the endless VR, and receives and evaluates the single ready state. Reception and evaluation of the endless VR movement is made by having U35 compare the endless VR voltage and D/A converter (U37) voltage, to determine whether the endless VR has been rotated. U18 is an IC for fetching data from the panel switches, and it receives the state when a switch is pressed.

U6 through U9 are a decoder circuit, and U6 uses PAL. The PAL has a circuit configuration capable of decoding the import and output clocks, ROM, and RAM. U7 through U9 decode individual information selected by U9.

U8 outputs the decoded information from inport U12, 13, 17, and 18, and the latch CLK (VLC, HLC, ALC, and LLC) for serial transfer.

U19 outputs the latch CLK (SLC) for serial transfer and the shift CLK (ASC, LSC, SSC, HSC, VSC).

U7 outputs the data latch CLK for serial transfers, the interrupt latches (U20, U21, U22, and U23), and the RESET pulse. The data latch CLK is also used as the CLK for latching the data for serial transfers by U16.

A blanking signal is applied during serial transfer to prevent the effects of noise on the waveform. This blanking is output from Pin 21 of U33.

U1 is RAM, and 8 K×8 bit memory is used. This SRAM is backed up by B1 when the power is off, and the power is switched by U19 when the power is turned on/off. Switching is performed by the U4 power reset IC, and a reset signal is supplied to U3, U5, and U19 at 4.4V +/−0.2 V.

U2 is a software ROM, and both 16 K and 32 K can be used by switching by R128 and R256.

Although CTM5020 (U33) can be directly connected to 8080-type CPUs, direct connection of address and data is not possible with the Z-80 due to the absence of an ALE terminal. For this reason an ALE signal is generated by the ADD/DATA SELE circuit formed by U27, U28, U23b, U14b and d, U25b, and U29c to allow connection with U33.

The software timer needed for CPU operation is created by U26 as a 2 ms timer. This is latched to U20a every 2 ms to indicate an interrupt to the CPU.

U3 is backed up by lithium battery B1 when the power is off, and the 32.768 kHz basic clock from the crystal oscillator operates. An interrupt signal is output from U3 once every minute, and is latched to U20b. The calender indication on the CRT is advanced one minute by the input of this interrupt.

The U37 D/A convertor creates the voltage output for endless VR comparison, the analog control voltage used by the horizontal unit (X74-1480-02), and the cursor control voltage. The latter control voltage is switched by the U41 analog switch, and is output once every 4 ms by time division. This output control is performed by AX0 through AX3 of U33, and AX3 is a control terminal to prevent the comparison voltage being output to the control voltage when this voltage for endless VR comparison is output from the U37 D/A convertor.

The cursor control voltage (Δ and Δ REF) output from U41 is switched with R/O-Y and R/O-X by the U40 and 43 analog switches, and output to the final amp.

There are analog control voltages used by the horizontal unit: B-vari, DTP, and H-posi.

B-vari output the reference voltages for sweep B, and the voltage determined by the 1-2-5 range is output (during CAL). During UNCAL, the B-vari voltage changes and the sweep time changes. At this time, the voltage is changed so that the amount of variation changes at the various ranges so that variation rate corresponds to the rotational speed of the endless VR. The count distribution is 2000 for range 1, 1000 for range 2, and 400 for range 5, and the amount of change per step is altered every 10, 6, and 2 counts respectively. B-vari passes through the U47a buffer amp before it is fed to the horizontal unit (X74-1480-02).

The following is a description of the operation of the rotary encoder used for switching volts/div and sweep time. The rotary encoder has two outputs, and rotation to the right or left is determined by the output resulting from the phase difference.

CIRCUIT DESCRIPTION

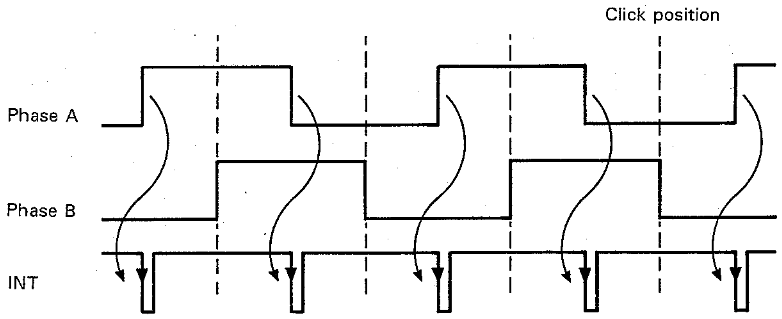


Fig. 2

Figure 2 shows the output waveforms of the rotary encoder, and phases A and B have the output waveforms indicated. In the case of the CH1 VOLTS/DIV rotary encoder, for example, the outputs from phases A and B are input to U29b and U31c respectively. U29 and U31 form a Schmitt circuit, eliminating chattering occurring when the rotary encoder is rotated, and shaping the waveforms to resemble those shown in the above diagram. (This is performed to prevent spurious operation.)

The signal with the waveform shaped is input to U30c, output as the INT signal shown in Figure 2. Q of U22a goes to "L" at the point indicated by the arrow and an interrupt signal is sent to the CPU. When the CPU enters the interrupt state, it immediately evaluates the status of phases A and B, determines the rotation to the right or left by the status of the change, and performs the appropriate processing. (The figure shows rotation to the right.)

U31a and U31b form the Schmitt for the CH2 VOLTS/div rotary encoder, U30d receives the signal after waveform shaping, and U23a receives the INT signal. U31d and U30a form the Schmitt for the CH2 Sweep Time/div rotary encoder, U30b receives the signal after waveform shaping, U22b receives the INT signal.

The DTP adds two analog voltages and is a 5000 count FS. These analog voltages are V-Delay and C-Delay. V- Delay is counted up to 4000 counts with C-Delay as 0 V, and is added by U45b. Following this, V-Delay and C-Delay are decreased one count each until 5000 counts are reached. This is equivalent to doubling the D/A resolution. The added DTP voltage passes through the U46b buffer amp, and is fed to the horizontal unit (X74-1480-02).

The voltage from the endless VRs used for cursor, H-POSI is received by the U34 analog switch, and the control signal for selecting the endless VR is selected by VX0 to VX2 of U33. The output of the endless VR selected by U34 is input to U35, and compared with the voltage output from D/A convertor U37 by U35. As the U37 D/A convertor is a 12-bit unit and 8 bits are output to the D/A (U33 DA0 to DA7), the upper 4 bits are latched by U36 and the remaining 8 bits are then output. The discrete circuit formed by Q1, Q2, etc., and connected to Pin 17 of U37 is a DC-DC convertor circuit used to supply −11 V to the D/A convertor.

The H-POSI voltage is supplied to the horizontal unit through the hold circuit.

A random can method (X-Y display) is used for character display, and the U32 character generator is controlled by the character counter of the U33 R/O controller and the dot counter.

One cycle for readout indication is divided into four, and consists of lower characters, upper characters, Δ REF cursor, and Δ cursor.

Character data having a basic configuration of 5×7 dots is input to the U32 character generator. The 3 bits from DO0 to DO2 are X-axis data, the four bits DO3 to DO6 are the Y-axis data, and DO7 is the character start/end control signal. The digital signal output from U32 is converted to the analog voltages by the U42 D/A convertor for the X-axis signal and the D/A convertor for the Y-axis signal formed by U39 and R58. These signals pass through analog switches U40 and U43, the U44 buffer amp, and are supplied to the final unit (X80-1100-02) as the R/O-X and R/O-Y character signals.

Character dot display on the CRT is controlled by the ROUB, ROB, and ROQ signals output from Pins 86, 87, and 88 of U33.

The ROB signal erases the real waveform display, the real waveform and readout are switched by the ROQ signal, and dot indication on the readout is performed by the ROUB signal.

CIRCUIT DESCRIPTION

TV Counter Unit (X76-1400-00)

The TV signal is input through pin 7 of P35, and the polarity is selected by U1a. When the base of Q4 is "L", Q2 goes ON and U1a becomes an inverted amplifier. The signal output from pin 1 of U1a passes through buffer amp U1b, clamps the sync signal at D1, and enters video amp U2. Then, the signal output from pin 7 of U2 is subjected to peak detection at D6 in order to maintain the amplitude of the output from pin 7 of U2 constant by controlling Q1. Q3 is the circuit which goes ON in other modes than the TV COUNT mode to cut the TV signal. The signal output from pin 7 of U2 is input to sync separator circuit U3. U4a is the circuit for extracting the equivalent pulse of horizontal sync signal. The pulse is supplied through gate U7 and used as the clock pulse of the TV counter circuit.

U5b detects the TV signal input and controls the auto-freerun circuit. U5a is the detector circuit of the interlaced, progressive signal.

U4b is the circuit which generates equivalent vertical sync signal when the progressive signal is input.

The output signal from U6a is differentiated by U7, sent through U6b, and output from pin 4 of P35 as the TV counter load pulse.

U8 is the shift register which loads and latches the serial data from the R/O.

U8 pin No.
- 1: "H" in TV counter mode, otherwise "L".
- 2: "L" in TV counter mode, otherwise "H".
- 3: "H" when A sweep time is between 0.2 ms/div and 20 ns/div in TV counter mode, otherwise "L".
- 15: "L" when TV is +SLOPE, "H" with −SLOPE.

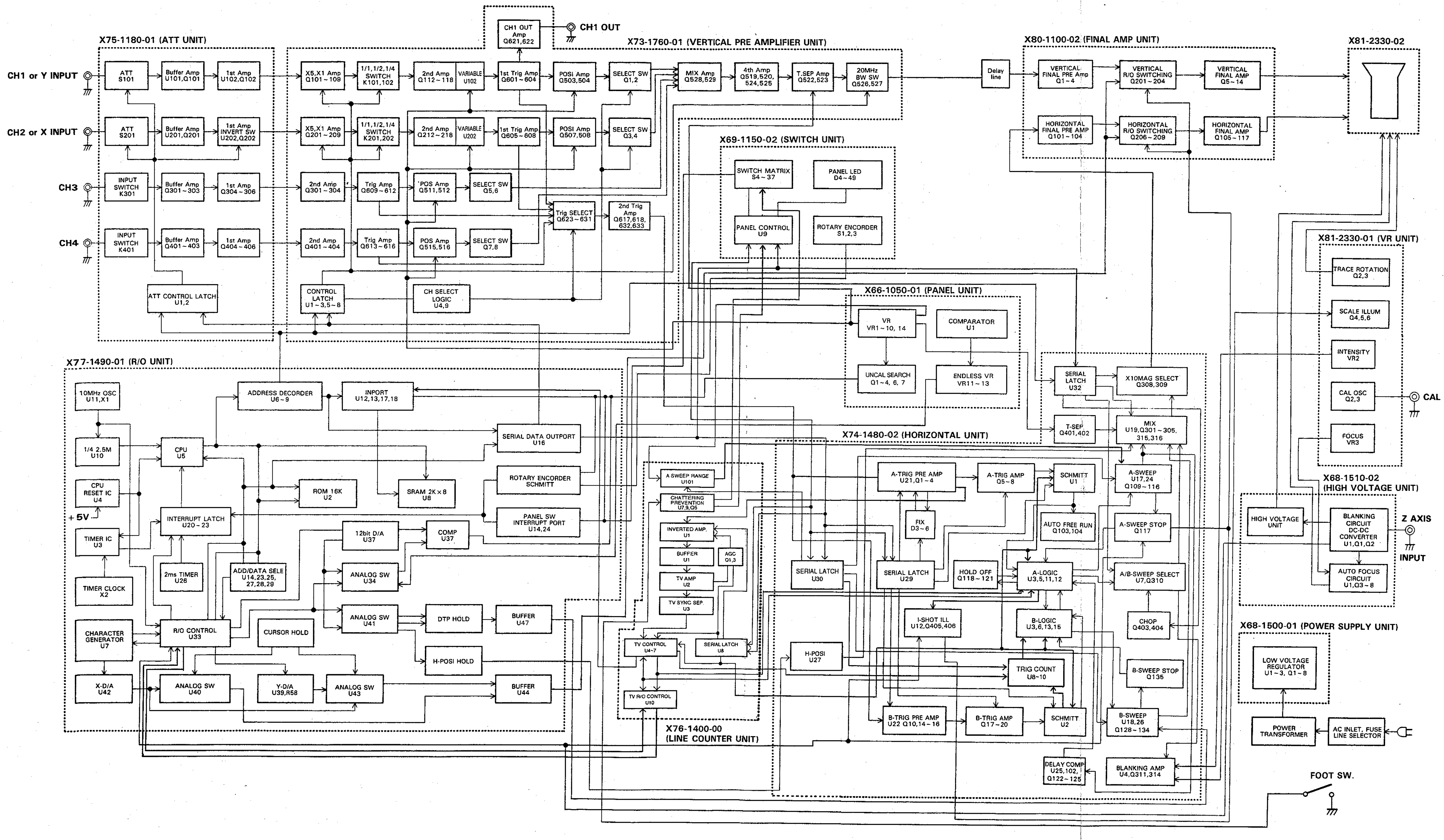
U10 is the circuit which eliminates a flicker of waveform in TV counter mode, and which also controls U33 (X77-1490-01).

* Chattering prevention circuit

The signal input to pin 1 of P36 as the program count-up signal is sent through the protector circuit of D7 and D8, and input to pin 1 of U9. When the signal is input to U9, its pin 4 outputs pulse for the specified period of time, during which chattering can be prevented. The output signal passes through D10, Q5 and U7, and controls D1 of the panel unit (X66-1050-01) and pin 5 of U9 to increment the count of the program.

D9 is the diode used to maintain the output "H" while the input signal level is "L" regardless of the time constant of U9.

BLOCK DIAGRAM


CH1 OUT Amp Q621,622
CH1 OUT
X75-1180-01 (ATT UNIT)
X73-1760-01 (VERTICAL PRE AMPLIFIER UNIT)
X80-1100-02 (FINAL AMP UNIT)
X81-2330-02
CH1 or Y INPUT
CH2 or X INPUT
CH3
CH4
ATT S101
Buffer Amp U101,Q101
1st Amp U102,Q102
ATT S201
Buffer Amp U201,Q201
1st Amp INVERT SW U202,Q202
INPUT SWITCH K301
Buffer Amp Q301~303
1st Amp Q304~306
INPUT SWITCH K401
Buffer Amp Q401~403
1st Amp Q404~406
ATT CONTROL LATCH U1,2
X5,X1 Amp Q101~109
1/1,1/2,1/4 SWITCH K101,102
2nd Amp Q112~118
VARIABLE U102
1st Trig Amp Q601~604
POSI Amp Q503,504
SELECT SW Q1,2
X5,X1 Amp Q201~209
1/1,1/2,1/4 SWITCH K201,202
2nd Amp Q212~218
VARIABLE U202
1st Trig Amp Q605~608
POSI Amp Q507,508
SELECT SW Q3,4
2nd Amp Q301~304
Trig Amp Q609~612
POS Amp Q511,512
SELECT SW Q5,6
2nd Amp Q401~404
Trig Amp Q613~616
POS Amp Q515,516
SELECT SW Q7,8
Trig SELECT Q623~631
2nd Trig Amp Q617,618, 632,633
CONTROL LATCH U1~3,5~8
CH SELECT LOGIC U4,9
MIX Amp Q528,529
4th Amp Q519,520, 524,525
T.SEP Amp Q522,523
20MHz BW SW Q526,527
Delay line
VERTICAL FINAL PRE Amp Q1~4
VERTICAL R/O SWITCHING Q201~204
VERTICAL FINAL AMP Q5~14
HORIZONTAL FINAL PRE AMP Q101~104
HORIZONTAL R/O SWITCHING Q206~209
HORIZONTAL FINAL AMP Q105~117
X69-1150-02 (SWITCH UNIT)
SWITCH MATRIX S4~37
PANEL LED D4~49
PANEL CONTROL U9
ROTARY ENCORDER S1,2,3
X81-2330-01 (VR UNIT)
TRACE ROTATION Q2,3
SCALE ILLUM Q4,5,6
INTENSITY VR2
CAL OSC Q2,3
CAL
FOCUS VR3
X66-1050-01 (PANEL UNIT)
VR VR1~10, 14
COMPARATOR U1
UNCAL SEARCH Q1~4, 6, 7
ENDLESS VR VR11~13
X77-1490-01 (R/O UNIT)
10MHz OSC U11,X1
1/4 2.5M U10
CPU U5
CPU RESET IC U4
+5V
TIMER IC U3
TIMER CLOCK X2
CHARACTER GENERATOR U7
X-D/A U42
ADDRESS DECORDER U6~9
INPORT U12,13,17,18
SERIAL DATA OUTPORT U16
ROTARY ENCORDER SCHMITT
PANEL SW INTERRUPT PORT U14,24
ROM 16K U2
SRAM 2K×8 U8
INTERRUPT LATCH U20~23
2ms TIMER U26
ADD/DATA SELE U14,23,25, 27,28,29
12bit D/A U37
COMP U37
ANALOG SW U34
ANALOG SW U41
DTP HOLD
BUFFER U47
H-POSI HOLD
R/O CONTROL U33
CURSOR HOLD
ANALOG SW U40
Y-D/A U39,R58
ANALOG SW U43
BUFFER U44
X76-1400-00 (LINE COUNTER UNIT)
A SWEEP RANGE U101
CHATTERING PREVENTION U7,9,Q5
INVERTED AMP U1
BUFFER U1
AGC Q1,3
TV AMP U2
TV SYNC SEP U3
TV CONTROL U4~7
SERIAL LATCH U8
TV R/O CONTROL U10
X74-1480-02 (HORIZONTAL UNIT)
SERIAL LATCH U32
X10MAG SELECT Q308,309
T-SEP Q401,402
MIX U19,Q301~305, 315,316
A-TRIG PRE AMP U21,Q1~4
A-TRIG AMP Q5~8
SCHMITT U1
A-SWEEP U17,24 Q109~116
FIX D3~6
AUTO FREE RUN Q103,104
A-SWEEP STOP Q117
SERIAL LATCH U30
SERIAL LATCH U29
HOLD OFF Q118~121
A-LOGIC U3,5,11,12
A/B-SWEEP SELECT U7,Q310
I-SHOT ILL U12,Q405,406
B-LOGIC U3,6,13,15
CHOP Q403,404
H-POSI U27
TRIG COUNT U8~10
B-SWEEP STOP Q135
B-TRIG PRE AMP U22 Q10,14~16
B-TRIG AMP Q17~20
SCHMITT U2
B-SWEEP U18,26 Q128~134
DELAY COMP U25,102, Q122~125
BLANKING AMP U4,Q311,314
X68-1510-02 (HIGH VOLTAGE UNIT)
HIGH VOLTAGE UNIT
BLANKING CIRCUIT DC-DC CONVERTER U1,Q1,Q2
Z AXIS INPUT
AUTO FOCUS CIRCUIT U1,Q3~8
X68-1500-01 (POWER SUPPLY UNIT)
LOW VOLTAGE REGULATOR U1~3, Q1~8
POWER TRANSFORMER
AC INLET, FUSE LINE SELECTOR
FOOT SW.

ADJUSTMENT

To obtain the best performance, periodically calibrate the unit. Sometimes, only one mode need be calibrated, while at other times, all modes should be calibrated. When one mode is calibrated, it must be noted that the other modes may be affected. When calibrating all modes, perform the calibration in the specified sequence.
The following calibration required an accurate measuring instrument and an insulated adjusting flat blade screwdriver. If they are not available, contact your dealer. For optimum adjustment, turn the power on and warm up the scope sufficiently (more than 30 minutes) before starting.
Before calibrating the scope, check the power supply voltage.

TEST EQUIPMENT REQUIRED

The following instrument or their equivalent should be used for making adjustment.

Test Equipment	Model	Minimum Specification
Digital Multi-Meter	DL-706 (KENWOOD)	Impedance: More than 10 MΩ, Measuring range: 0.01 V to 199 V
Sine-Wave Generator	651 B (YHP)	Frequency: 10 Hz to 10 MHz, constant voltage over tuning range
Sine-Wave Generator	SG-503 (Tektronix)	Frequency: 50 kHz to 100 MHz, Output impedance: 50 Ω, constant voltage over tuning range
Square-Wave Generator	PG-506 (Tektronix)	Output signal: 1 kHz, Amplitude: 10 mVp-p to 10 Vp-p, Accuracy: within ± 1%, Rise time: 35ns or less 100 kHz, Rise time: 1 ns or less
Q Meter	4343B (YHP)	–
Color Pattern Generator	CG-911A (KENWOOD)	–
Oscilloscope	475A (Tektronix)	Sensitivity: more than 5 mV Frequency response: More than 250 MHz
Time-Marker Generator	TG-501 (Tektronix)	Time mark: 0.5 s to 0.1μs repetive waveform
High-Voltage Probe	–	Input Impedance: 1000 MΩ
Termination	–	Impedance: 50 Ω Accuracy: within 3%
Termination	–	3 watts type impedance: 50 Ω
Attenuator	–	– 20 dB attenuation (50 Ω)

Table 1

PREPARATION FOR ADJUSTMENT

Control Settings

The control settings listed below must be used for each adjustment procedure.
Exceptions to these settings will be noted as they occur.
After completing a adjustment, return the controls to the following settings.

NAME OF KNOBS	POSITION
INTEN	12 o'clock, A INTEN
READOUT INTEN	Fully counterwise
FOCUS, ASTIG	Optimum position
CH1, CH2, CH3, CH4 ⬍ POSITION	Mechanical center
◄► POSITION/×10MAG	Mechanical center/OFF
VARIABLE, H.VARIABLE (VOLTS/DIV, SWEEP TIME/DIV)	CAL
AC-GND-DC (CH1 and CH2)	DC (GND: ON)
VERTICAL MODE	CH1
A.TRIGGERING COUPLING	AC
A.TRIGGERING SOURCE	VERT and CH1
TRIGGERING LEVEL	Mechanical center
TRIGGERING MODE	AUTO
VOLTS/DIV (CH1 and CH2)	10 mV/DIV
SWEEP TIME/DIV	1 ms/DIV
HORIZONTAL MODE	A
CH3, CH4	0.1 V
TRIG.COUNT	OFF
DELAY POSITION	OFF

Table 2

ADJUSTMENT

1. POWER SUPPLY & CRT SECTION ADJUSTMENTS

Item	Adjustment VR (TC)	P.C.B.	Procedure
– 10 V	VR1	X68-1500	Adjust VR1 so that the voltage at pin 8 of the connector P17 is – 10.00 V.
Intensity	VR1	X68-1510	Display the spot on the CRT screen, and adjust VR1 so that the spot disappears when the INTEN knob is set to the 9 o'clock position.
Focus Center	VR2	X68-1510	Push the FOCUS knob in (for the FOCUS operation) and then set it to the mechanical center position. Pull the knob out (for the ASTIG operation), display a spot on the screen, and adjust the ASTIG control and VR2 to minimize the dimension of the spot.
CRT Center	VR513	X73-1760	VERTICAL MODE: CH1, CH2, ADD Make the luminescent line overlap at each ⬍ position. Adjust VR513 so that the luminescent line is moved to the center of the CRT screen.
Vertical Center Voltage	VR3	X80-1100	Turn off R/O. In the state of CRT Center Adjustment, adjust VR3 so that the voltage at pin 1 of the connector P14 becomes 37.5 V.
Horizontal Center Voltage	VR102	X80-1100	Engage the CH1 mode. Activate the X-Y operation mode, and set so that the spot moves to the center of the CRT. Adjust VR102 so that the voltage at pin 1 of the connector P15 becomes 67.5 V.
R/O Vertical Gain	VR4	X80-1100	Set the ΔV VR control to "MIN" and "MAX" (↺ ↻) in turns. Adjust VR4 so that the separation between these two settings for the cursor is of 8 divisions of the scale.
R/O Vertical Position	VR201	X80-1100	In the state of the R/O Vertical Gain Adjustment, adjust VR201 to meet the following scale values: 0 division – ↺ 8 divisions – ↻
R/O Horizontal Gain	VR101	X80-1100	Set the ΔT VR control to "MIN" and "MAX" (↺ ↻) in turns. Adjust VR101 so that the separation between these two settings for the cursor is of 10 divisions of the scale.
R/O Horizontal Position	VR202	X80-1100	In the state of R/O Horizontal Gain Adjustment, adjust VR202 to meet the following scale values: 0 division – ↺ 10 divisions – ↻

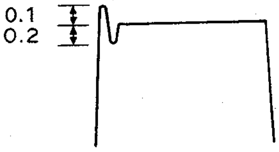
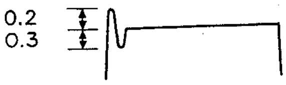
2. VERTICAL SECTION ADJUSTMENTS

Item	Adjustment VR (TC)	P.C.B.	Procedure
CH2 INV Balance	VR201	X75-1180	Adjust VR201 so that even when the CH2 INV switch is turned ON/OFF repeatedly, the luminescent lines does not move.
CH2 INV Position	VR101	X75-1180	Short between pin 1 and pin 3 at P5. Set the vertical mode to "CH1", "CH2", then "ADD". Set it to the scale center by "⬍ POSITION". Remove the short-circuiting. Adjust VR101 so that the deviated luminescent line comes to the scale center.
CH1 Step ATT Balance	VR103 VR101	X73-1760	Adjust VR103 so that the position of the luminescent line does not change even when the vertical attenuator is selected between 1 and 2 mV range. Switch the range between 2 and 5 mV ranges, and perform the same adjustment using VR101. Make the adjustment in the 5 mV range with refarence to the 2 mV range.

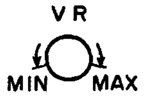
ADJUSTMENT

Item	Adjustment VR (TC)	P.C.B.	Procedure
CH2 Step ATT Balance	VR203 VR201	X73-1760	Adjust in the same way as for CH1.
CH1 Position Center	VR503	X73-1760	CH1 POSITION : Mechanical center position CH1 VOLTS/DIV : 10 mV Adjust VR503 so that the trace is located on the center of the screen.
CH2 Position Center	VR506	X73-1760	Adjust in the same way as for CH1.
CH3 Position Center	VR509	X73-1760	Adjust in the same way as for CH1.
CH4 Position Center	VR512	X73-1760	Adjust in the same way as for CH1
CH1 Variable Balance	VR104	X73-1760	Adjust VR104 so that the position of the luminescent line does not change even if the VARIABLE knob is rotated. Vary the settings of the VOLTS/DIV and VARIABLE controls and see if the trace position also moves; if it does, adjust VR103, 101 and 104 again.
CH2 Variable Balance	VR204	X73-1760	Adjust in the same way as for CH1.
CH1 Gain	VR501	X73-1760	CH1 VOLTS/DIV: 10 mV Input a square wave signal having an amplitude of 50 mV, and adjust VR501 so that the CRT amplitude becomes 5 div.
CH1 1 mV Range Gain	VR102	X73-1760	CH1 VOLTS/DIV: 1 mV Input a square wave signal having an amplitude of 5 mV, and adjust VR102 so that the CRT amplitude becomes 5 div.
CH2 Gain	VR504	X73-1760	Adjust in the same way as for CH1.
CH2 1 mV Range Gain	VR202	X73-1760	Adjust in the same way as for CH1.
CH3 Gain	VR507	X73-1760	CH3 VOLTS/DIV: 0.5 V Input a square wave signal having an amplitude of 0.5 V, and adjust VR507 so that the CRT amplitude becomes 5 div.
CH4 Gain	VR510	X73-1760	Adjust in the same way as for CH3.
CH1 Waveform Shaping	TC105 TC103	X75-1180	AC-GND-DC: DC Apply 1 kHz square wave to CH1 input (with the amplitude extending over 4 to 6 div). Set CH1 VOLTS/DIV to 0.1 V range (and 1 V range), and adjust TC105 (and TC103) so that the waveform becomes flat in both ranges.
CH1 Input Capacity	TC104 TC102	X75-1180	AC-GND-DC : DC CH1 VOLTS/DIV : 10 mV Connect the capacity meter to the CH1 input, and measure the input capacity in the 10 mV range. Adjust TC104 and TC102, alternately, so that the input capacity in the 0.1 V and the 1 V ranges equals the same capacity as in the 10 mV range.
CH2 Waveform Shaping	TC205 TC203	X75-1180	Adjust in the same way as for CH1.
CH2 Input Capacity	TC204 TC202	X75-1180	Adjust in the same way as for CH1.
CH3 Waveform Shaping	TC302	X75-1180	Apply 1 kHz square wave to CH1 input (with the amplitude extending over 4 to 6 div). Set CH3 volts/div to 0.5 V range, and adjust TC302 so that the waveform becomes flat.

ADJUSTMENT

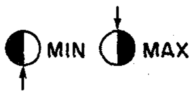
Item	Adjustment VR (TC)	P.C.B.	Procedure
CH3 Input Capacity	TC301	X75-1180	Connect the capacity meter to the CH3 input, and measure the input capacity in the 0.1 V range. Adjust TC301, so that the input capacity in the 0.5 V range equals the same capacity as in the 0.1 V range.
CH4 Waveform Shaping	TC402	X75-1180	Adjust in the same way for CH3.
CH4 Input Capacity	TC401	X75-1180	Adjust in the same way for CH3.
CH1 Square Wave Characteristics	TC101 TC501 VR502	X73-1760	CH1, 2 VOLTS/DIV : 10 mV VERTICAL MODE : CH1 CH1, 2 AC-GND-DC: DC TRIG. SOURCE : VERT SWEEP TIME/DIV : 1 μs HORIZONTAL MODE : A V. VARIABLE : CAL • Input a 1 MHz square wave signal into CH1 (with a CRT amplitude of 6 div.). * Adjust TC101 so that the overshoot is maximized. * Set a TC or the VR to an adjustment angle as shown in Figure 1 or 2 to bring about +0.1/−0.1 division of the scale. • Input the 1 MHz square wave signal into CH2 (with the CRT amplitude of 6 div.). * Adjust TC201 so that the overshoot is maximized. * Set a TC or the VR to an adjustment angle as shown in Figure 1 to bring about +0.1/−0.2 division of the scale. 
	TC1 TC2 VR1	X80-1100	
	TC101	X75-1180	
CH2 Square Wave Characteristics	TC201 TC502 VR505	X73-1760	
	TC201	X75-1180	
CH3 Square Wave Characteristics	TC503 VR508	X73-1760	CH3, 4 VOLTS/DIV : 10 mV * Set a TC or VR to an adjustment angle as shown in Figure 1 to bring about +0.2/−0.3 division of the scale. 
CH4 Square Wave Characteristics	TC504 VR511	X73-1760	

ADJUSTMENT



"MIN": Rotated fully counterclockwise
"MAX": Rotated fully clockwise

TC (without lock mechanism)



Counterclockwise rotation: Unclear waveform (Under)
Clockwise rotation: Clear waveform (over)

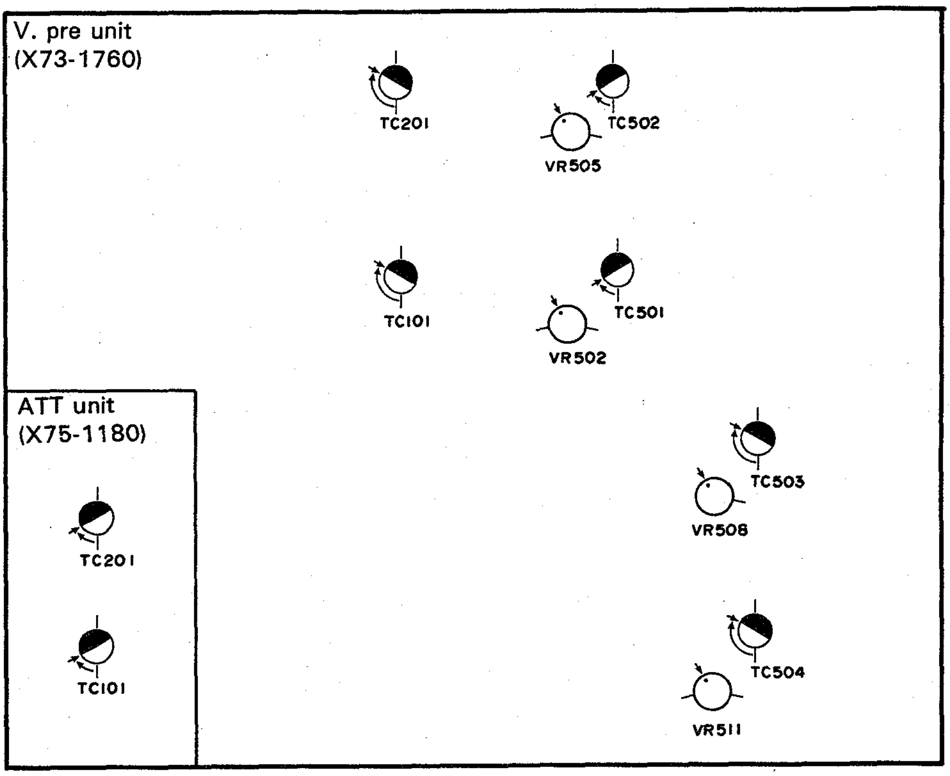

V. pre unit
(X73-1760)
TC201
TC502
VR505
TC101
TC501
VR502
ATT unit
(X75-1180)
TC201
TC101
TC503
VR508
TC504
VR511

Fig. 1

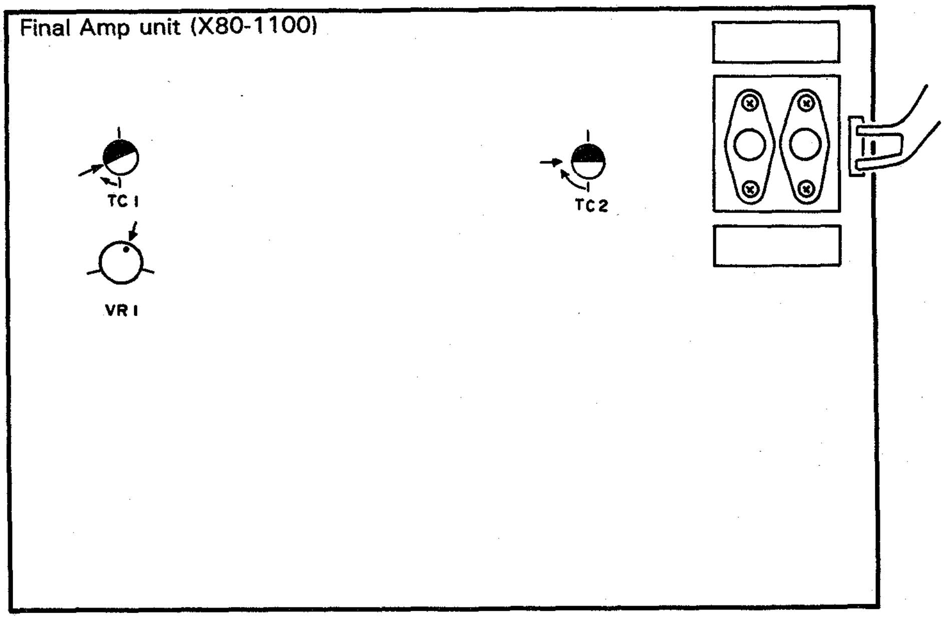
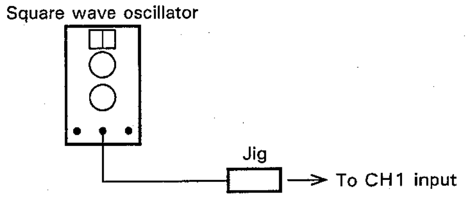
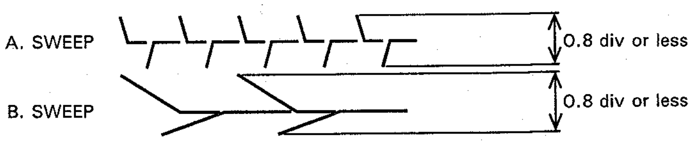

Final Amp unit (X80-1100)
TC1
TC2
VR1

Fig. 2

ADJUSTMENT

3. TRIGGER SECTION ADJUSTMENTS

Item	Adjustment VR (TC)	P.C.B.	Procedure
FIX Level Center	VR1	X74-1480	VERTICAL MODE : CH1 TRIG. SOURCE : VERT HORIZONTAL MODE : A CH1 VOLTS/DIV : 0.1 V AC-GND-DC : DC V. VARIABLE : CAL SWEEP TIME/DIV : 0.2 ms Input a 1 kHz sine wave into CH1, and adjust the oscillator so that the CRT amplitude becomes 6 div. Adjust VR1 so that start point of the luminescent line is at the center of the CRT (vertical direction).
A TRIG. DC Coupling	VR601(CH1) VR602(CH2) VR603(CH3) VR604(CH4)	X73-1760	After adjusting the trigger level center, set the TRIGGERING COUPLING to the DC position. Adjust VR601 so that the start point of the luminescent line is at the same position as in the AC mode.
B TRIG. Level Center	VR4	X74-1480	VERTICAL MODE : CH1 TRIG. SOURCE : VERT HORIZONTAL MODE : B LEVEL : Mechanical center CH1 VOLTS/DIV : 0.1 V B. COUPLING : AC SWEEP TIME/DIV : 0.2 ms Input a 1 kHz sine wave to CH2, and adjust the oscillator so that the CRT amplitude becomes 6 div. Adjust VR4 so that start point of the luminescent line is at the center of the CRT (vertical direction).
B TV sensitivity	VR3	X74-1480	V. MODE : CH1 AC-GND-DC : DC SWEEP TIME/DIV : A 10 μs. B 5 μs HORIZONTAL MODE : ALT A. COUPLING : TV LINE TRIG. SOURCE : VERT VOLTS/DIV : 0.2 V Connect the jig to CH1 and apply 100 kHz square wave through the jig. Adjust SLOPE +/− until triggering occurs. Perform the adjustment until the triggering amplitude becomes 0.8 div or less.  

ADJUSTMENT

4. HORIZONTAL SECTION ADJUSTMENTS

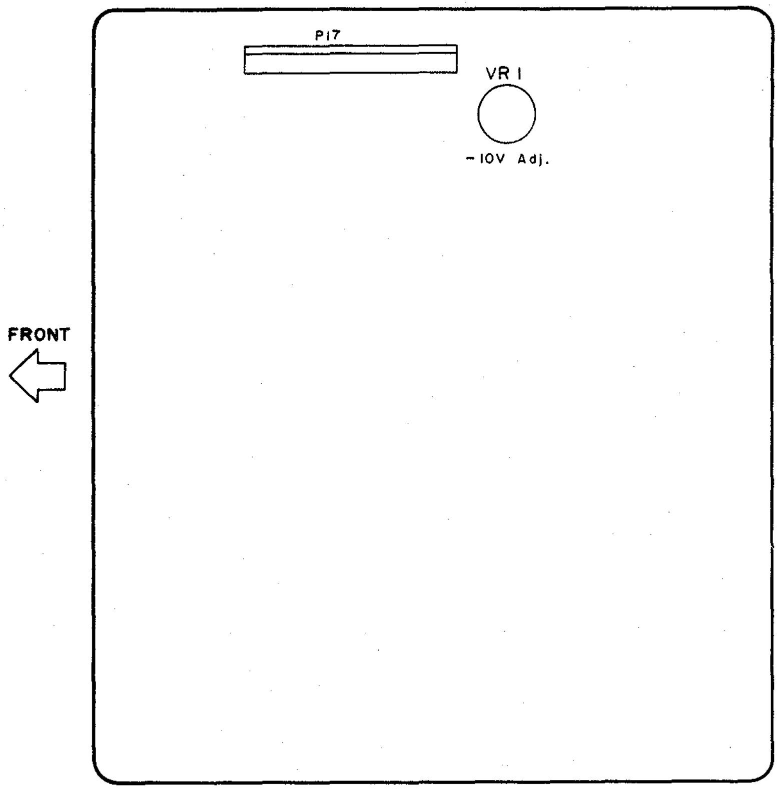
Item	Adjustment VR (TC)	P.C.B.	Procedure
A SWEEP Time	VR301	X74-1480	SWEEP TIME/DIV: 1 ms Input a 1 ms marker signal into CH1. Adjust VR301 so that the peak of the marker signal matches the CRT scale divided in 1 div.
	VR307	X74-1480	SWEEP TIME/DIV: 1 ms Input a 1 ms marker signal into CH1, and match the peak of the marker signal with the CRT scale divided in 1 div. Set to the X10 MAG status, and adjust VR307 so that the interval between peaks becomes 10 div.
	VR103	X80-1100	SWEEP TIME/DIV: 0.2 μs Input a 0.2 μs marker signal into CH1. Set to the X10 MAG status, and adjust the horizontal POSITION so that the peak of the waveform is at the vertical scale line at the center of the CRT. Release the X10 MAG mode and adjust VR103 so that the peak of the waveform matches the vertical scale line at the center of the CRT.
	TC101	X74-1480	SWEEP TIME/DIV: 2 μs Adjust TC101 in the same way as for 1 ms adjustment.
	TC302		SWEEP TIME/DIV: 20 ns Adjust TC302 in the same way as for 1 ms adjustment.
	TC103	X80-1100	SWEEP TIME/DIV: 50 ns X10 MAG : ON Input a 5 ns marker signal into CH1. Adjust TC103 so that the peak of the marker signal matches the CRT scale divided in 1 div.
	TC101	X80-1100	SWEEP TIME/DIV: 20 ns X10 MAG : ON Input a 2 ns sine wave signal into CH1. Adjust TC101 so that the peak of the marker signal matches the CRT scale divided in 2 div. Repeat this adjustment for 20 ns, 5 ns, then 2 ns to obtain optimum point.
B SWEEP Time	VR302	X74-1480	SWEEP TIME/DIV: 1 ms Input a 1 ms marker signal into CH1. Adjust VR302 so that the peak of the marker signal matches the CRT scale divided in 1 div.
	VR104	X74-1480	SWEEP TIME/DIV: 1 ms ~ 5 ms Input a 1 ms ~ 5 ms signal into CH1, and adjust in the same way as for 1 ms
	TC102	X74-1480	SWEEP TIME/DIV: 2 μs Input a 2 μs marker signal into CH1, and adjust in the same way as for 1 ms adjustment.
	TC303	X74-1480	SWEEP TIME/DIV: 20 ns Input a 20 ns marker signal into CH1, and adjust in the same way as for 1 ms adjustment.

ADJUSTMENT

Item	Adjustment VR (TC)	P.C.B.	Procedure
A Sweep Position	VR304	X74-1480	HORIZ. MODE : A SOURCE : VERT VERTICAL MODE : CH1 A SWEEP TIME/DIV : 1 ms TRIG. MODE : AUTO Apply a 1 ms marker signal to CH1 to display a waveform to the center of the CRT screen. Rotate the ◄► POSITION control to maximum clockwise. Measure the deviation between the starting point of the trace and the center of the graticule line. Next, rotate the ◄► POSITION control to maximum counterclockwise and measure the distance between the 12th peak of the waveform and the center of the graticule line. Adjust VR304 so that these deviations will have the same width.
B Sweep Position	VR305	X74-1480	HORIZ. MODE : ALT SLOPE : + A, B INTEN : Fully counterwise Operate ↕ TRACE SEP control to separate the A sweep and B sweep. Set the A VARIABLE to CAL. Adjust VR305 to align the starting point of B sweep with that of A sweep in the horizontal position.
X Gain	VR303	X74-1480	CH2 VOLTS/DIV : 10 mV CH2 AC-GND-DC : AC HORIZONTAL MODE : X-Y V. VARIABLE : CAL Input the square wave signal having an amplitude of 50 mV into CH2, and adjust VR303 so that the CRT amplitude in the horizontal direction becomes 5 div.
X Position	VR306	X74-1480	VERTICAL MODE : CH1 TRIG. SOURCE : CH1 CH1/CH2 AC-GND-DC : GND HORIZONTAL MODE : A SWEEP TIME/DIV 1 ms Set the scope controls to display a trace to the graticule center. Adjust VR306 to position to trace to horizontal graticule when switched the HORIZ. MODE switch to X-Y position. Clockwise rotation of channel 1 position control should move up to 5 divisions upward and counterclockwise rotation should move up to 5 divisions downward.
Delay time	VR101 VR102	X74-1480	HORIZ. MODE : ALT CH1/CH2 AC-GND-DC : GND A SWEEP TIME/DIV : 1 ms B SWEEP TIME/DIV : 0.2 μs Rotate the DELAY POSITION control to 0.20 position and set the scope controls to coincide A trace with the left end of the graticule scale, using the horizontal position control. Adjust VR101 to position B trace (intensified portion) to 0.2 div position. Adjust VR102 to position B trace to 10 div. position (right end of the graticule scale) when rotated the DELAY POSITION control to 10.00 position.
CAL Voltage	VR5 VR6	X81-2330	Apply a CAL signal to channel 1 input. Adjust VR5 so that one period becomes 0.1 ms (10 div). Adjust VR6 so that the amplitude becomes 0.2 V (5 div.)

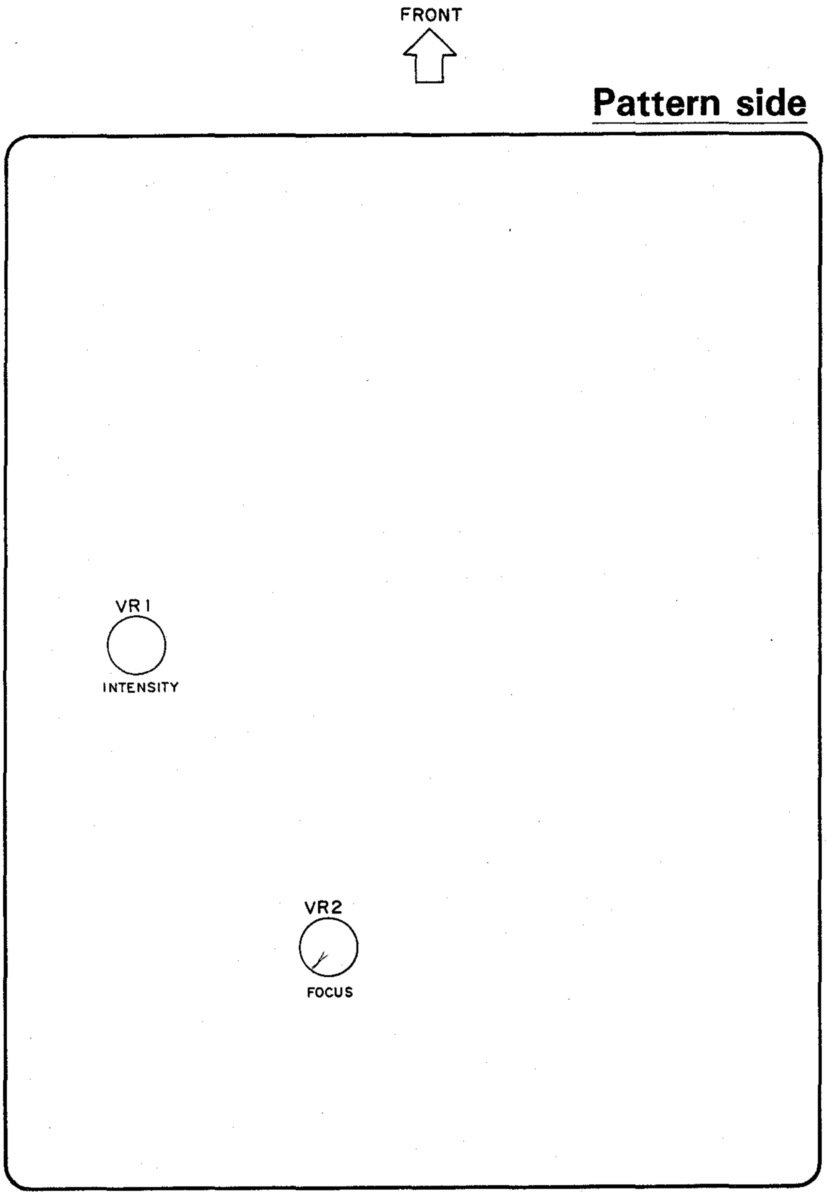
ADJUSTMENT

POWER SUPPLY UNIT (X68-1500-01)


P17
VR1
−10V Adj.
FRONT

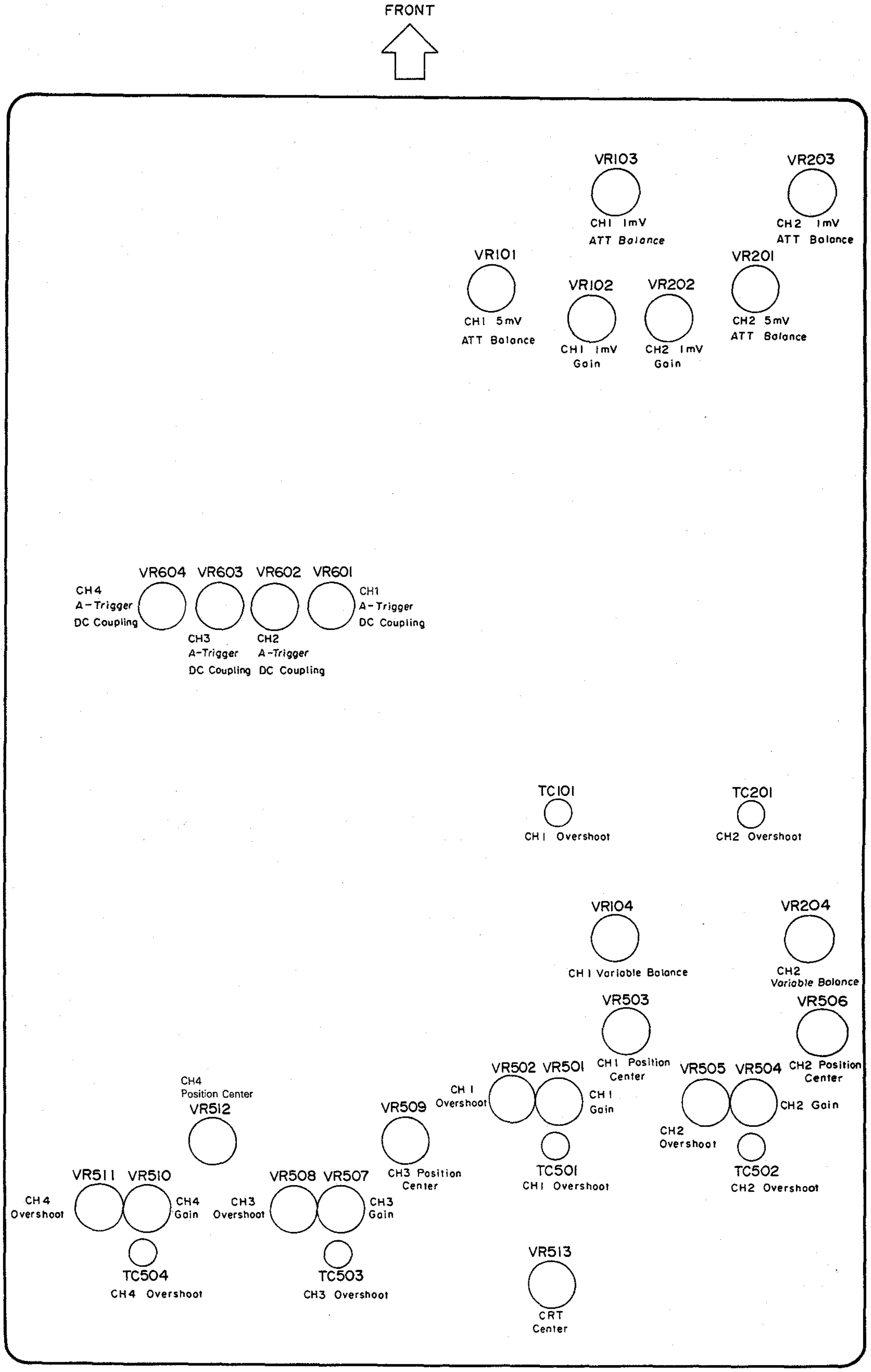
ADJUSTMENT

HIGH VOLTAGE UNIT (X68-1510-02)


FRONT
Pattern side
VR1
INTENSITY
VR2
FOCUS

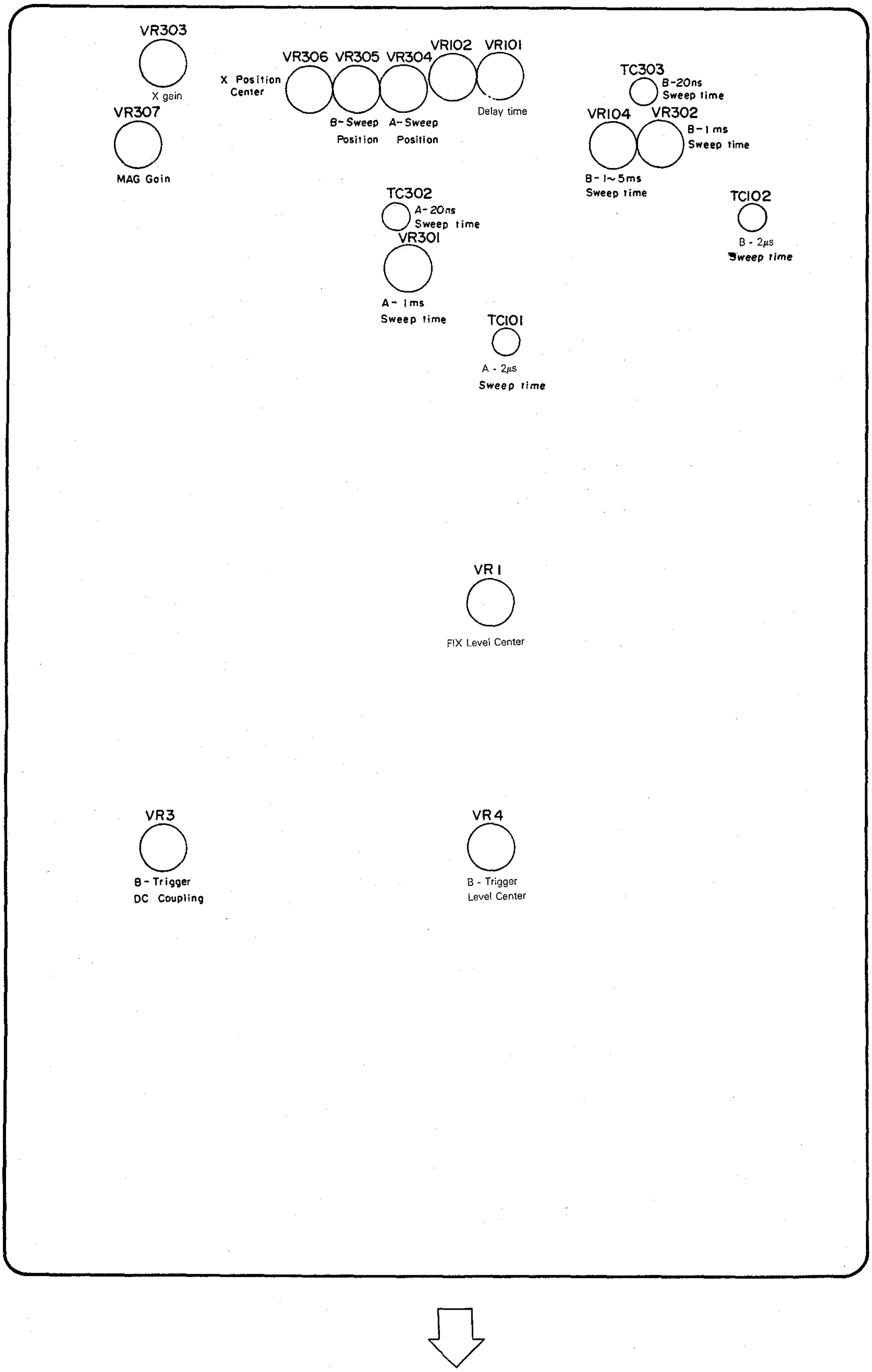
ADJUSTMENT

VERTICAL PRE AMPLIFIER UNIT (X73-1760-01)


FRONT
VR103
CH1 1mV
ATT Balance
VR203
CH2 1mV
ATT Balance
VR101
CH1 5mV
ATT Balance
VR102
CH1 1mV
Gain
VR202
CH2 1mV
Gain
VR201
CH2 5mV
ATT Balance
VR604 VR603 VR602 VR601
CH4
A-Trigger
DC Coupling
CH3
A-Trigger
DC Coupling
CH2
A-Trigger
DC Coupling
CH1
A-Trigger
DC Coupling
TC101
CH1 Overshoot
TC201
CH2 Overshoot
VR104
CH1 Variable Balance
VR204
CH2
Variable Balance
VR503
CH1 Position
Center
VR506
CH2 Position
Center
VR502 VR501
CH1
Overshoot
CH1
Gain
VR505 VR504
CH2
Overshoot
CH2 Gain
TC501
CH1 Overshoot
TC502
CH2 Overshoot
CH4
Position Center
VR512
VR509
CH3 Position
Center
VR511 VR510
CH4
Overshoot
CH4
Gain
VR508 VR507
CH3
Overshoot
CH3
Gain
TC504
CH4 Overshoot
TC503
CH3 Overshoot
VR513
CRT
Center

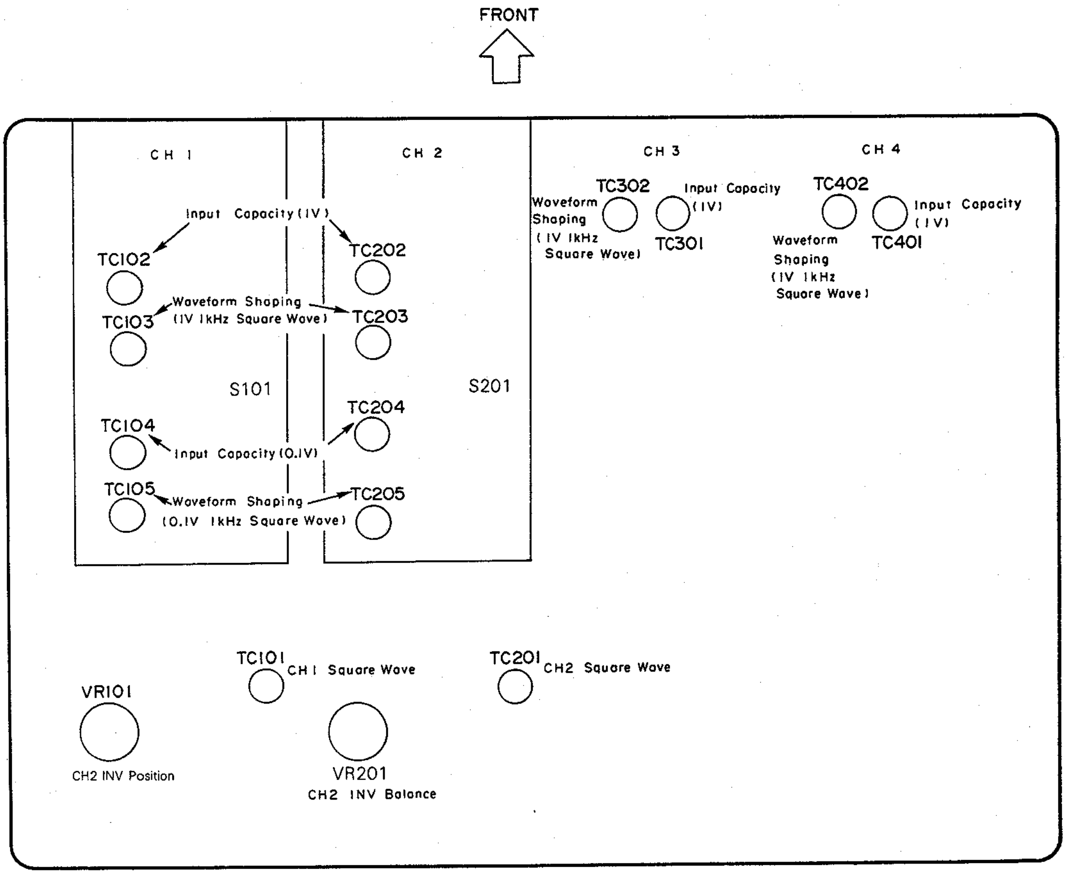
ADJUSTMENT

HORIZONTAL UNIT (X74-1480-02)

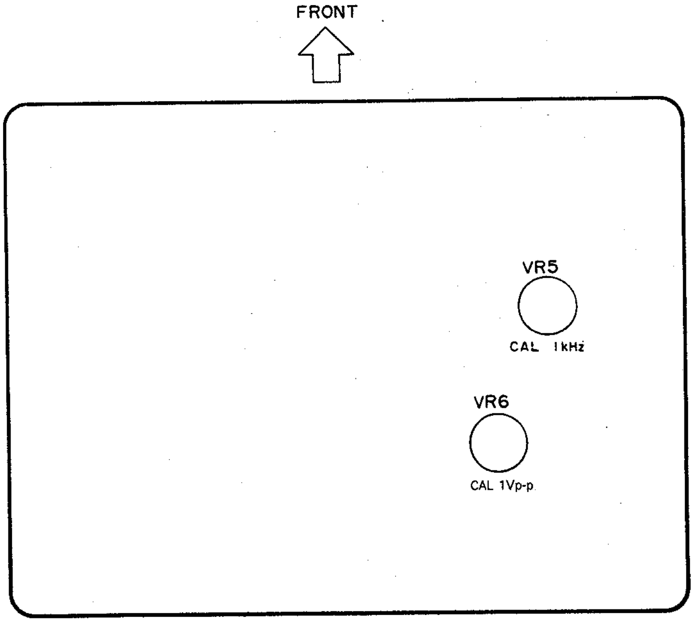

VR303
X gain
VR307
MAG Gain
VR306 VR305 VR304
X Position Center
B-Sweep Position
A-Sweep Position
VR102 VR101
Delay time
TC303
B-20ns Sweep time
VR104 VR302
B-1ms Sweep time
B-1~5ms Sweep time
TC302
A-20ns Sweep time
VR301
A-1ms Sweep time
TC102
B-2μs Sweep time
TC101
A-2μs Sweep time
VR1
FIX Level Center
VR3
B-Trigger DC Coupling
VR4
B-Trigger Level Center
FRONT

ADJUSTMENT

ATT UNIT (X75-1180-01)

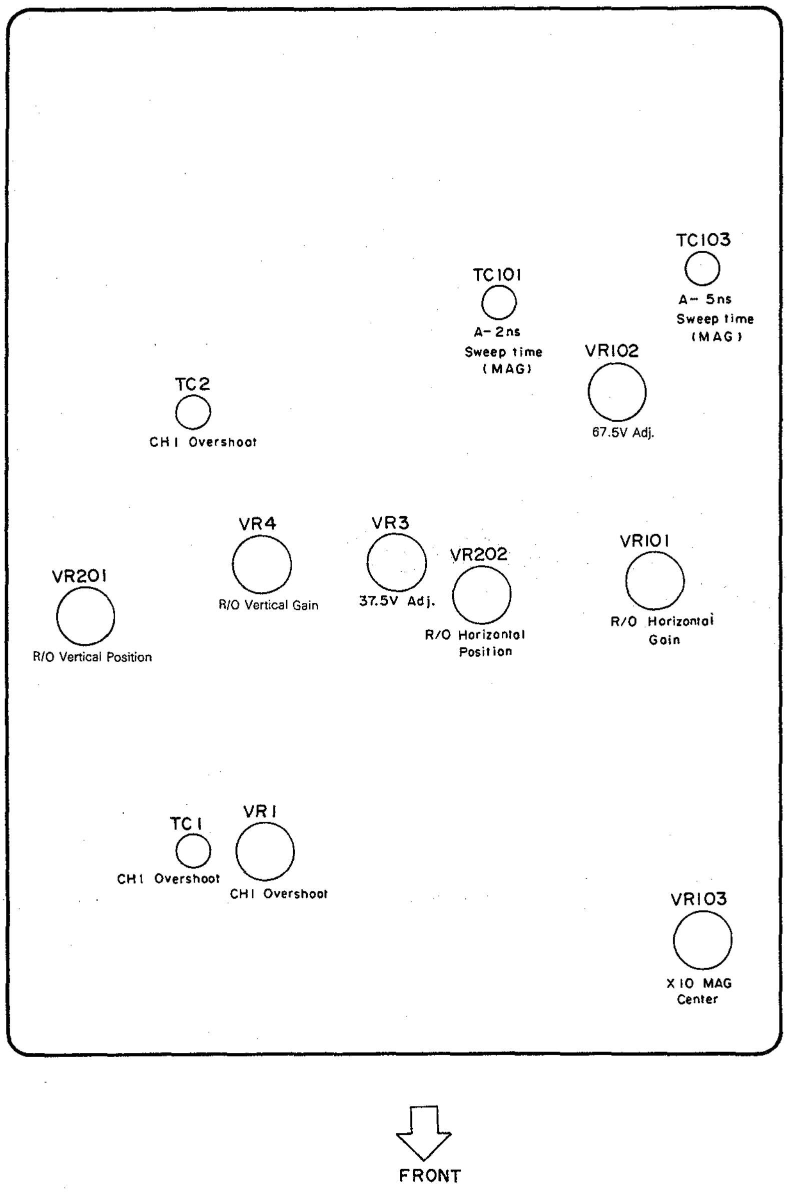

FRONT
CH 1
CH 2
CH 3
CH 4
Input Capacity (1V)
TC102
TC202
Waveform Shaping (1V 1kHz Square Wave)
TC103
TC203
S101
S201
TC104
TC204
Input Capacity (0.1V)
TC105
TC205
Waveform Shaping (0.1V 1kHz Square Wave)
TC302
Waveform Shaping (1V 1kHz Square Wave)
TC301
Input Capacity (1V)
TC402
TC401
Input Capacity (1V)
Waveform Shaping (1V 1kHz Square Wave)
TC101
CH 1 Square Wave
TC201
CH2 Square Wave
VR101
CH2 INV Position
VR201
CH2 INV Balance

VOLUME UNIT (X81-2330-02)

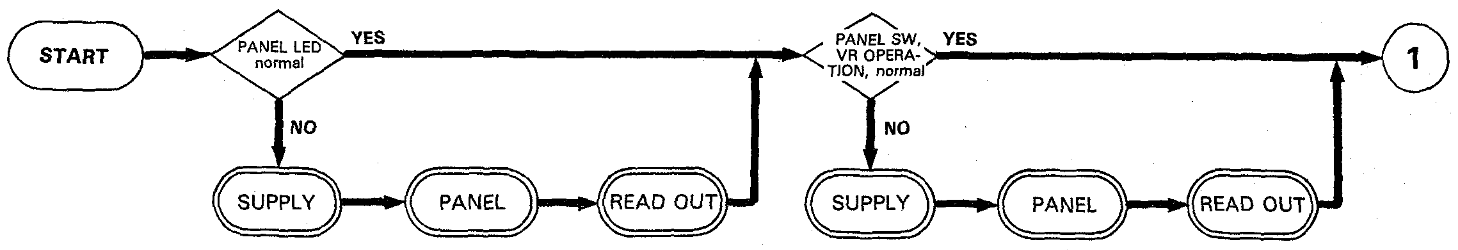

FRONT
VR5
CAL 1kHz
VR6
CAL 1Vp-p

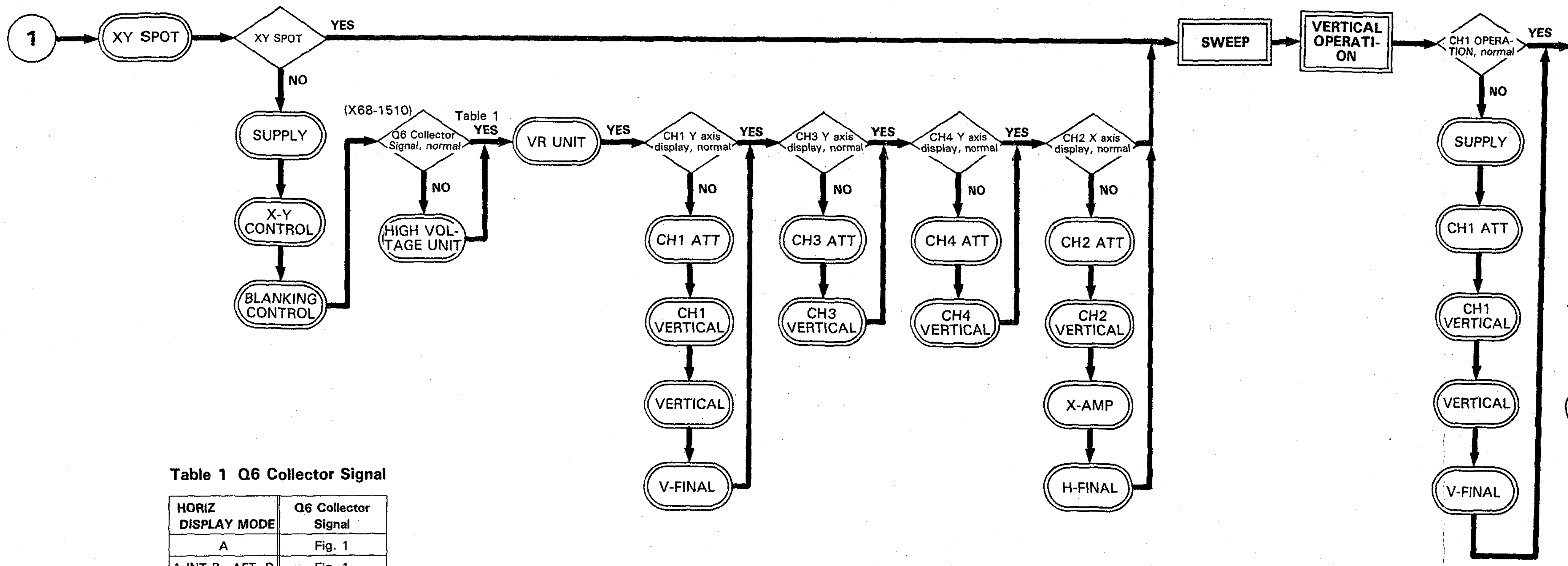
ADJUSTMENT

FINAL AMP UNIT (X80-1100-02)


TC103
A– 5ns
Sweep time
(MAG)
TC101
A– 2ns
Sweep time
(MAG)
VR102
67.5V Adj.
TC2
CH1 Overshoot
VR4
R/O Vertical Gain
VR3
37.5V Adj.
VR202
R/O Horizontal
Position
VR101
R/O Horizontal
Gain
VR201
R/O Vertical Position
TC1
CH1 Overshoot
VR1
CH1 Overshoot
VR103
X10 MAG
Center
FRONT

TROUBLESHOOTING


START
PANEL LED normal
YES
NO
SUPPLY
PANEL
READ OUT
PANEL SW, VR OPERATION, normal
YES
NO
SUPPLY
PANEL
READ OUT
1


1
XY SPOT
XY SPOT
YES
NO
SUPPLY
X-Y CONTROL
BLANKING CONTROL
(X68-1510)
Table 1
Q6 Collector Signal, normal
YES
NO
HIGH VOLTAGE UNIT
VR UNIT
YES
CH1 Y axis display, normal
YES
NO
CH1 ATT
CH1 VERTICAL
VERTICAL
V-FINAL
CH3 Y axis display, normal
YES
NO
CH3 ATT
CH3 VERTICAL
CH4 Y axis display, normal
YES
NO
CH4 ATT
CH4 VERTICAL
CH2 X axis display, normal
NO
CH2 ATT
CH2 VERTICAL
X-AMP
H-FINAL
SWEEP
VERTICAL OPERATION
CH1 OPERATION, normal
YES
NO
SUPPLY
CH1 ATT
CH1 VERTICAL
VERTICAL
V-FINAL

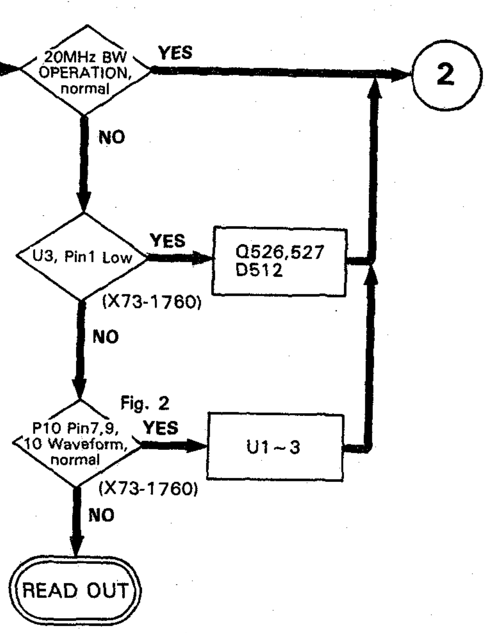

20MHz BW OPERATION, normal
YES
2
NO
U3, Pin1 Low
YES
Q526,527 D512
(X73-1760)
NO
Fig. 2
P10 Pin7,9, 10 Waveform, normal
YES
U1~3
(X73-1760)
NO
READ OUT

Table 1 Q6 Collector Signal

HORIZ DISPLAY MODE	Q6 Collector Signal
A	Fig. 1
A INT B AFT. D	Fig. 1
ALT AFT. D	Fig. 1
B AFT. D	Fig. 1
X-Y	30 ~ 60V

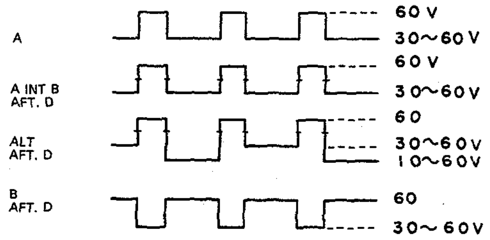


Fig. 1 Q6 Collector Signal

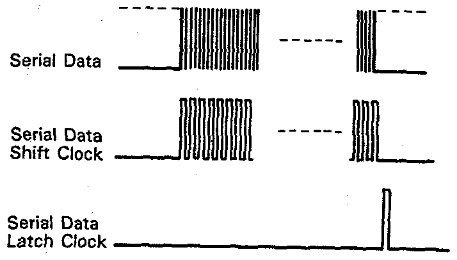
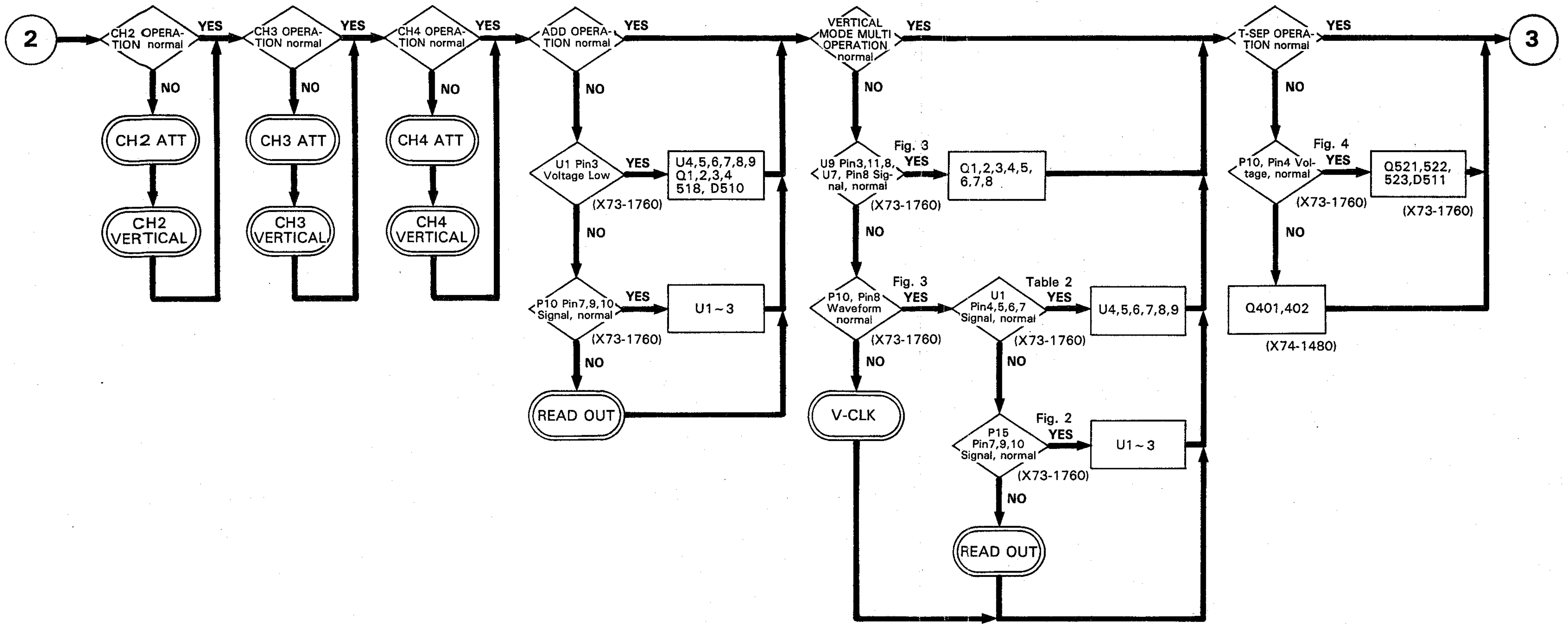


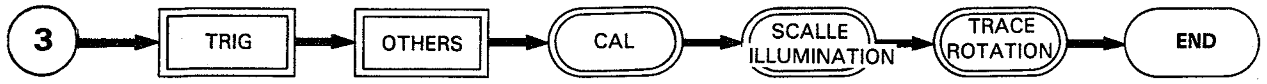
Fig. 2 Serial transmit timing chart

	Panel SW SCAN	Panel LED Control	ATT UNIT Control	V UNIT Control	H UNIT Control
Serial Data	P1 Pin 4 (SD)	P1 Pin 1 (LD)	P4 Pin 9 (AD)	U16 Pin 16 (VD)	U16 Pin 19 (HD)
Serial Data Shift Clock	P1 Pin 5 (SSC)	P1 Pin 2 (LSC)	P4 Pin 8 (ASC)	U9 Pin 14 (VSC)	U9 Pin 10 (HSC)
Serial Data Latch Clock	P1 Pin 6 (SLC)	P1 Pin 3 (LLC)	P4 Pin 7 (ALC)	U8 Pin 11 (VLC)	U8 Pin 7 (HLC)

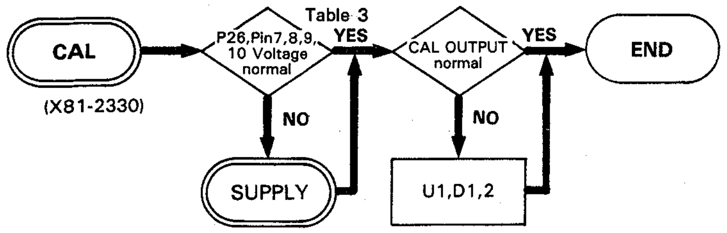
TROUBLESHOOTING



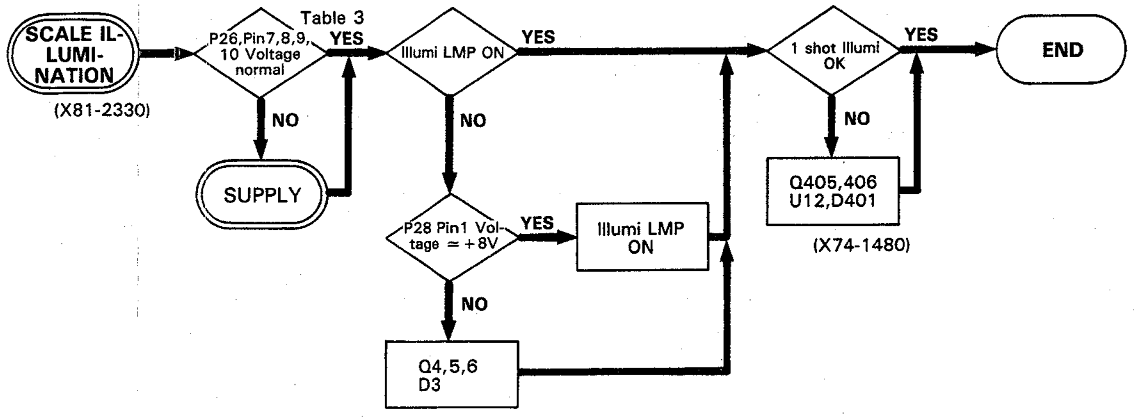
2
CH2 OPERATION normal
YES
NO
CH2 ATT
CH2 VERTICAL
CH3 OPERATION normal
CH3 ATT
CH3 VERTICAL
CH4 OPERATION normal
CH4 ATT
CH4 VERTICAL
ADD OPERATION normal
U1 Pin3 Voltage Low
(X73-1760)
U4,5,6,7,8,9 Q1,2,3,4 518, D510
P10 Pin7,9,10 Signal, normal
U1~3
READ OUT
VERTICAL MODE MULTI OPERATION normal
Fig. 3
U9 Pin3,11,8, U7, Pin8 Signal, normal
Q1,2,3,4,5, 6,7,8
P10, Pin8 Waveform normal
V-CLK
Table 2
U1 Pin4,5,6,7 Signal, normal
U4,5,6,7,8,9
Fig. 2
P15 Pin7,9,10 Signal, normal
U1~3
READ OUT
T-SEP OPERATION normal
Fig. 4
P10, Pin4 Voltage, normal
Q521,522, 523,D511
(X73-1760)
Q401,402
(X74-1480)
3



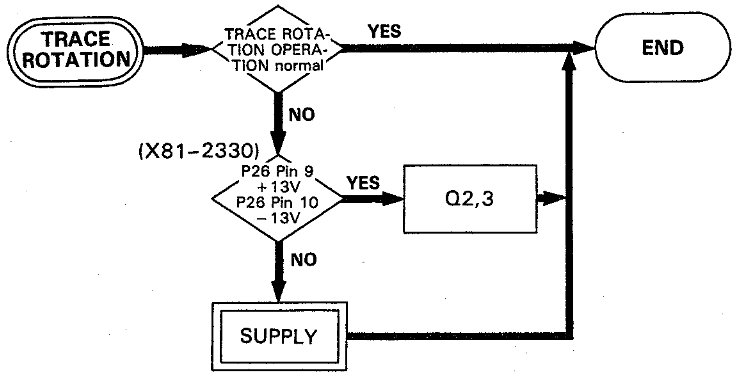
3
TRIG
OTHERS
CAL
SCALLE ILLUMINATION
TRACE ROTATION
END



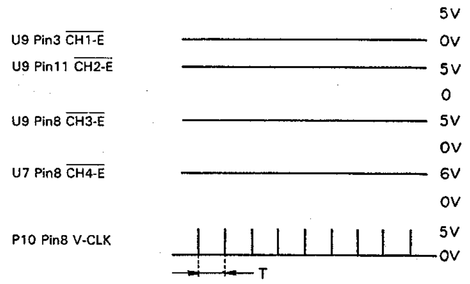
CAL
(X81-2330)
Table 3
P26,Pin7,8,9, 10 Voltage normal
YES
NO
SUPPLY
CAL OUTPUT normal
U1,D1,2
END



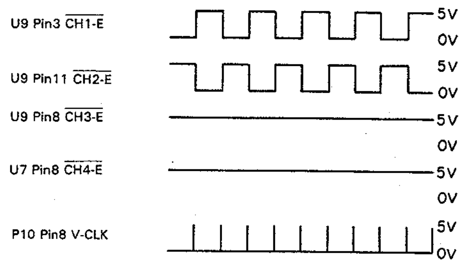
SCALE ILLUMINATION
(X81-2330)
Table 3
P26,Pin7,8,9, 10 Voltage normal
YES
NO
SUPPLY
Illumi LMP ON
P28 Pin1 Voltage ≃ +8V
Illumi LMP ON
Q4,5,6 D3
1 shot Illumi OK
Q405,406 U12,D401
(X74-1480)
END


TRACE ROTATION
TRACE ROTATION OPERATION normal
YES
END
NO
(X81-2330)
P26 Pin 9 +13V
P26 Pin 10 −13V
YES
Q2,3
NO
SUPPLY

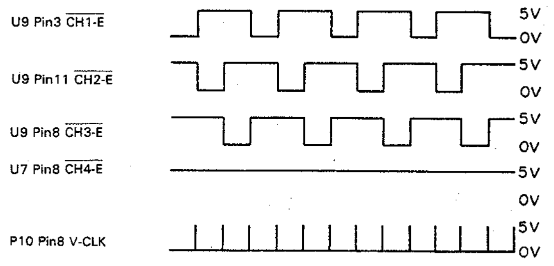
TROUBLESHOOTING


U9 Pin3 CH1-E
U9 Pin11 CH2-E
U9 Pin8 CH3-E
U7 Pin8 CH4-E
P10 Pin8 V-CLK
5V
0V
5V
0
5V
0V
6V
0V
5V
0V
T

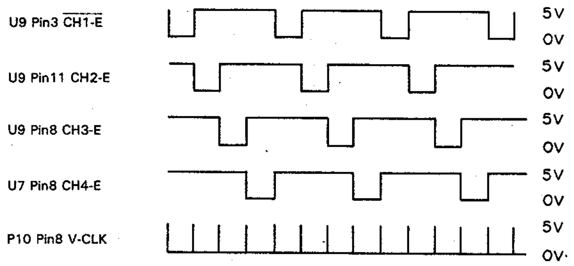
(a) CH1 SELECT


U9 Pin3 CH1-E
U9 Pin11 CH2-E
U9 Pin8 CH3-E
U7 Pin8 CH4-E
P10 Pin8 V-CLK
5V
0V
5V
0V
5V
0V
5V
0V
5V
0V

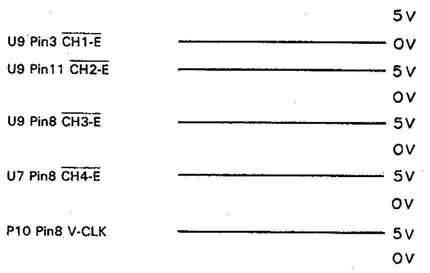
(b) CH1, CH2 SELECT


U9 Pin3 CH1-E
U9 Pin11 CH2-E
U9 Pin8 CH3-E
U7 Pin8 CH4-E
P10 Pin8 V-CLK
5V
0V
5V
0V
5V
0V
5V
0V
5V
0V

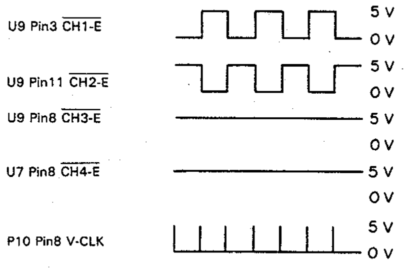
(c) CH1, CH2, CH3 SELECT


U9 Pin3 CH1-E
U9 Pin11 CH2-E
U9 Pin8 CH3-E
U7 Pin8 CH4-E
P10 Pin8 V-CLK
5V
0V
5V
0V
5V
0V
5V
0V
5V
0V

(d) CH1, CH2, CH3, CH4 SELECT


U9 Pin3 CH1-E
U9 Pin11 CH2-E
U9 Pin8 CH3-E
U7 Pin8 CH4-E
P10 Pin8 V-CLK
5V
0V
5V
0V
5V
0V
5V
0V
5V
0V

(e) X-Y CH1 SELECT


U9 Pin3 CH1-E
U9 Pin11 CH2-E
U9 Pin8 CH3-E
U7 Pin8 CH4-E
P10 Pin8 V-CLK
5 V
0 V
5 V
0 V
5 V
0 V
5 V
0 V
5 V
0 V

(f) X-Y CH1, CH2 SELECT

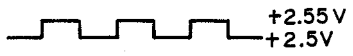
Fig. 3 VERTICAL CH SELECT WAVEFORM

T: H-MODE A, A INT B, B, X-Y
42 μs: 24kHz

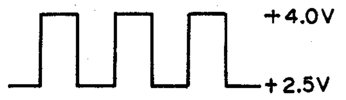
T: H-MODE ALT
84 μs: 12kHz

Table 2 U1, CH SELECT Voltage

CH SELECT	U1				
	Pin3	Pin4	Pin5	Pin6	Pin7
CH1					L
CH2				L	
CH3			L		
CH4		L			
ADD	LOW				



(a) FULLY CW



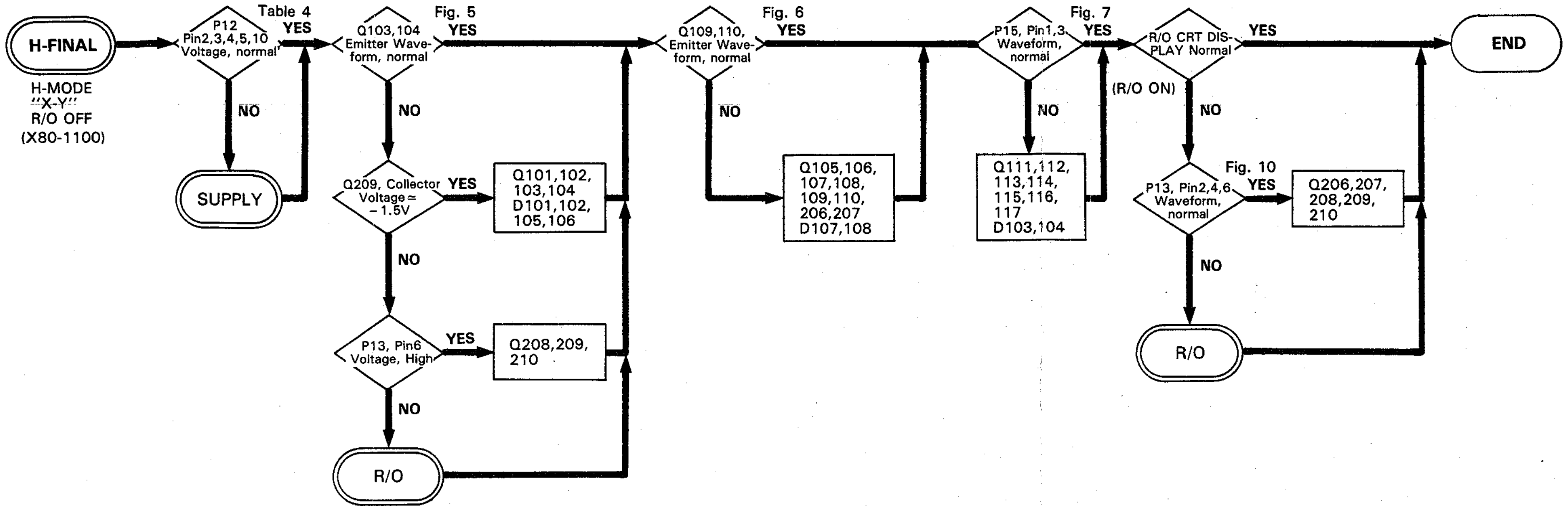
(b) FULLY CCW

Fig. 4 P10, Pin4 Waveform

Table 3 Voltage

P26 Pin No.	Voltage [V]
7	+10
8	−10
9	+13
10	−13

TROUBLESHOOTING


H-FINAL
H-MODE
"X-Y"
R/O OFF
(X80-1100)
P12 Pin2,3,4,5,10 Voltage, normal
Table 4
YES
NO
SUPPLY
Q103,104 Emitter Waveform, normal
Fig. 5
YES
NO
Q209, Collector Voltage≈ −1.5V
YES
Q101,102, 103,104 D101,102, 105,106
NO
P13, Pin6 Voltage, High
YES
Q208,209, 210
NO
R/O
Q109,110, Emitter Waveform, normal
Fig. 6
YES
NO
Q105,106, 107,108, 109,110, 206,207 D107,108
P15, Pin1,3, Waveform, normal
Fig. 7
YES
NO
Q111,112, 113,114, 115,116, 117 D103,104
R/O CRT DISPLAY Normal
(R/O ON)
YES
END
NO
P13, Pin2,4,6 Waveform, normal
Fig. 10
YES
Q206,207, 208,209, 210
NO
R/O

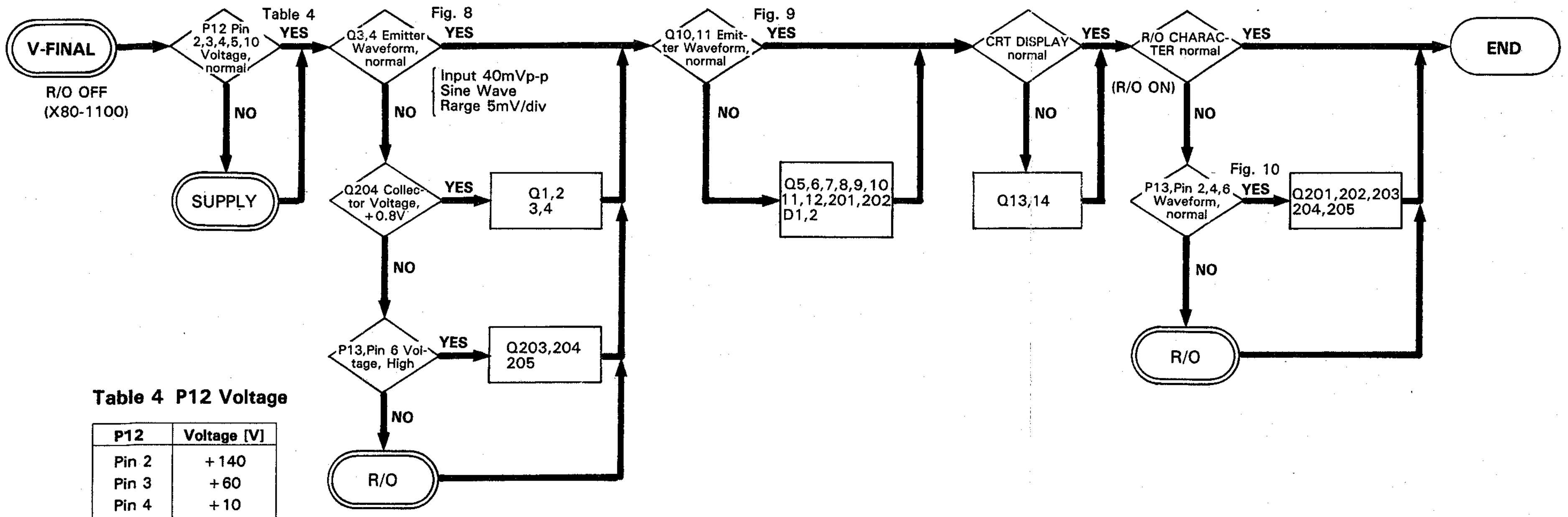

V-FINAL
R/O OFF
(X80-1100)
P12 Pin 2,3,4,5,10 Voltage, normal
Table 4
YES
NO
SUPPLY
Q3,4 Emitter Waveform, normal
Fig. 8
YES
Input 40mVp-p
Sine Wave
Rarge 5mV/div
NO
Q204 Collector Voltage, +0.8V
YES
Q1,2 3,4
NO
P13,Pin 6 Voltage, High
YES
Q203,204 205
NO
R/O
Q10,11 Emitter Waveform, normal
Fig. 9
YES
NO
Q5,6,7,8,9,10 11,12,201,202 D1,2
CRT DISPLAY normal
YES
NO
Q13,14
R/O CHARACTER normal
(R/O ON)
YES
END
NO
P13,Pin 2,4,6 Waveform, normal
Fig. 10
YES
Q201,202,203 204,205
NO
R/O

Table 4 P12 Voltage

P12	Voltage [V]
Pin 2	+140
Pin 3	+60
Pin 4	+10
Pin 5	−10
Pin10	+15

TROUBLESHOOTING

H-MODE "X-Y"
CH2 Input: 40mVp-p 1kHz Sine Ware
Volts/div: 5mV/div

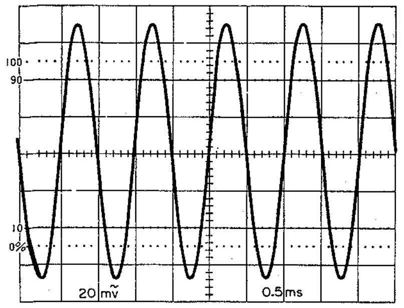


Fig. 5 DC −0.3V

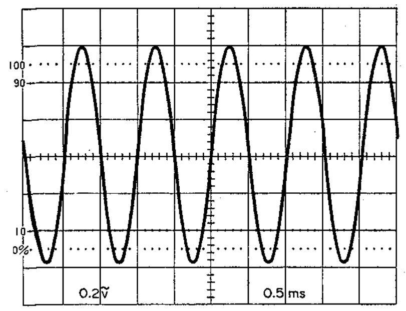


Fig. 6 DC −4V

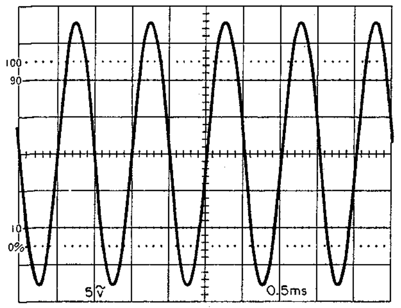
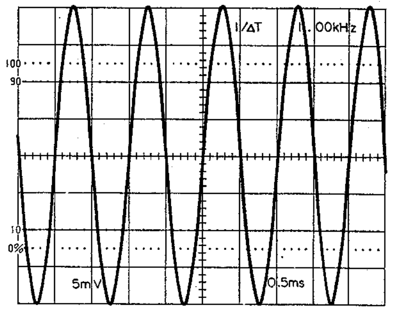


Fig. 7 DC +70V

Input: 40mVp-p, 1 kHz
Sine Wave
Volts/div: 5mV/div



CRT

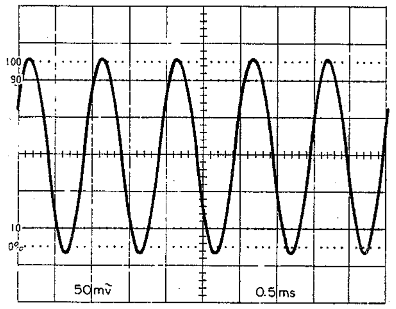


Fig. 8 DC +2.6V

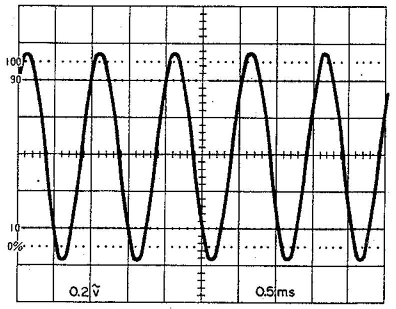
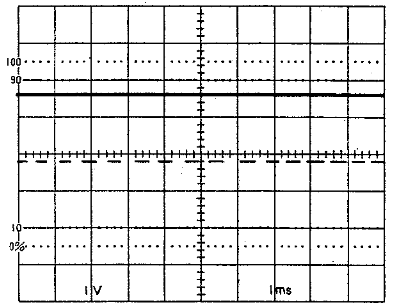
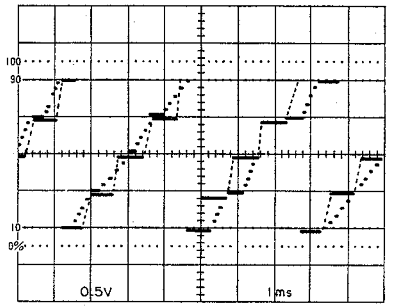


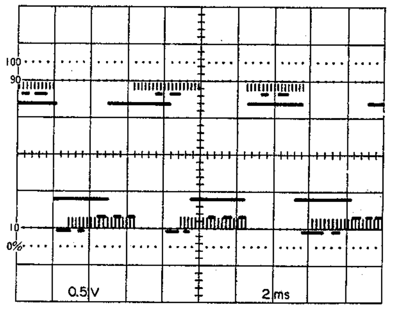
Fig. 9 DC +3.7V



Pin 6



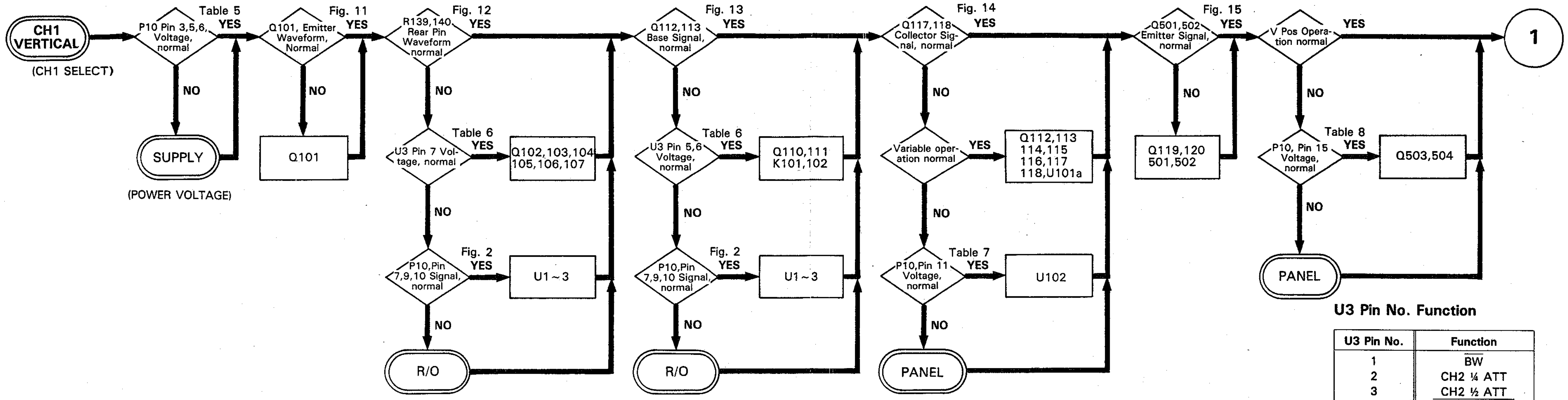
Pin 4



Pin 2

Fig. 10 P13. R/O Signal (R/O ON)

TROUBLESHOOTING


CH1 VERTICAL
(CH1 SELECT)
Table 5
P10 Pin 3,5,6, Voltage, normal
YES
NO
SUPPLY
(POWER VOLTAGE)
Fig. 11
Q101, Emitter Waveform, Normal
Q101
Fig. 12
R139,140, Rear Pin Waveform normal
Table 6
U3 Pin 7 Voltage, normal
Q102,103,104 105,106,107
Fig. 2
P10,Pin 7,9,10 Signal, normal
U1~3
R/O
Fig. 13
Q112,113 Base Signal, normal
Table 6
U3 Pin 5,6 Voltage, normal
Q110,111 K101,102
Fig. 2
P10,Pin 7,9,10 Signal, normal
U1~3
R/O
Fig. 14
Q117,118 Collector Signal, normal
Variable operation normal
Q112,113 114,115 116,117 118,U101a
Table 7
P10,Pin 11 Voltage, normal
U102
PANEL
Fig. 15
Q501,502 Emitter Signal, normal
Q119,120 501,502
V Pos Operation normal
Table 8
P10, Pin 15 Voltage, normal
Q503,504
PANEL
1

U3 Pin No. Function

U3 Pin No.	Function
1	$\overline{\text{BW}}$
2	CH2 ¼ ATT
3	CH2 ½ ATT
4	$\overline{\text{CH2} \times 5\ \text{Amp}}$
5	CH1 ¼ ATT
6	CH1 ½ ATT
7	$\overline{\text{CH1} \times 5\ \text{Amp}}$
15	—

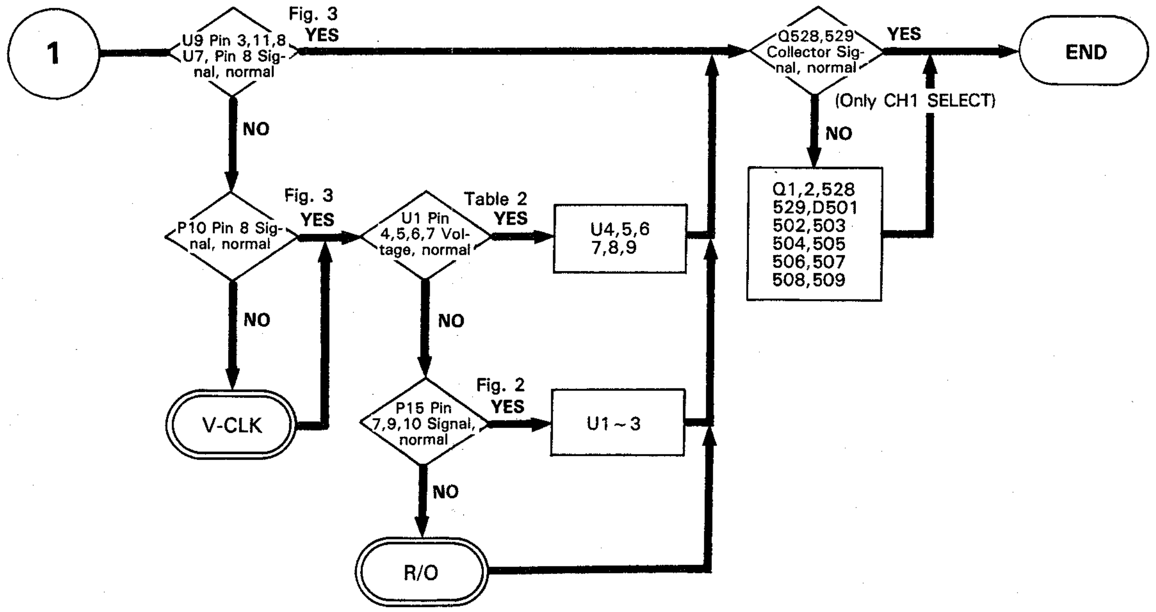

1
Fig. 3
U9 Pin 3,11,8, U7, Pin 8 Signal, normal
YES
NO
Fig. 3
P10 Pin 8 Signal, normal
V-CLK
Table 2
U1 Pin 4,5,6,7 Voltage, normal
U4,5,6 7,8,9
Fig. 2
P15 Pin 7,9,10 Signal, normal
U1~3
R/O
Q528,529 Collector Signal, normal
(Only CH1 SELECT)
Q1,2,528 529,D501 502,503 504,505 506,507 508,509
END

Table 5 Vpre Power Voltage

P10	Voltage [V]
Pin3	+10
Pin5	+ 5
Pin6	−10

Table 6 U3 Pin Voltage

Volts/div	CH2			CH1		
	Pin2	Pin3	Pin4	Pin5	Pin6	Pin7
1 mV						
2		H			H	
5			H			H
10		H	H		H	H
20	H	H	H	H	H	H
50			H			H
0.1 V		H	H		H	H
0.2	H	H	H	H	H	H
0.5			H			H
1.0		H	H		H	H
2.0	H	H	H	H	H	H
5.0			H			H

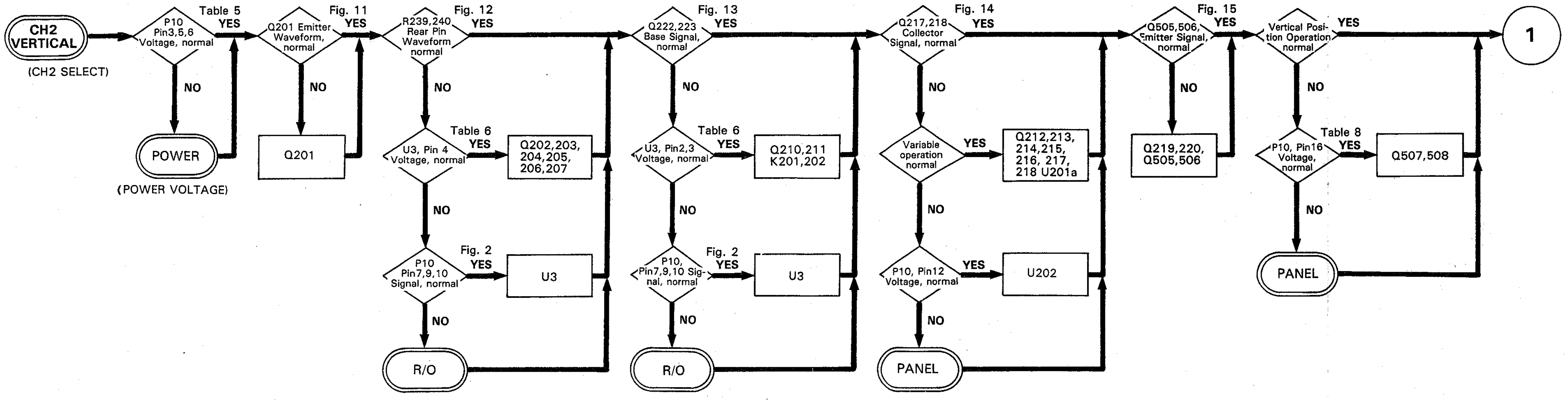
Table 7 P10 CAL~UNCAL

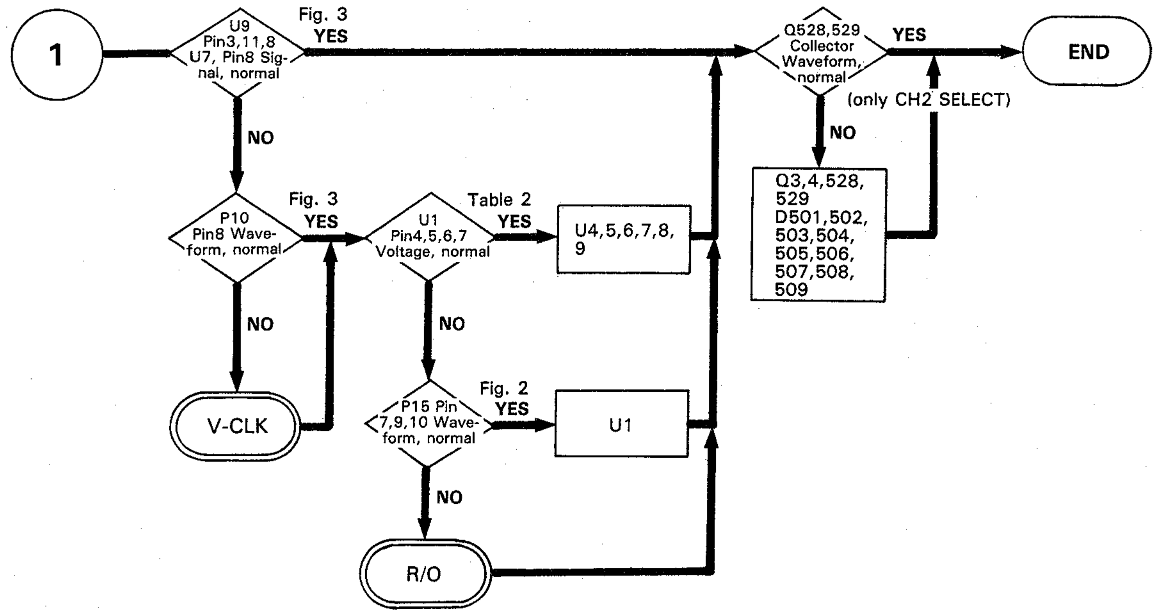
P10	CAL ~ UNCAL
Pin11	0 ~ +10V
Pin12	0 ~ +10V

Table 8 P10 POS VR

P10	Pos VR Fully CW ~ Fully CCW
Pin15	−10V ~ +10V
Pin16	−10V ~ +10V
Pin13	−10V ~ +10V
Pin14	−10V ~ +10V

TROUBLESHOOTING


CH2 VERTICAL
(CH2 SELECT)
Table 5
P10 Pin3,5,6 Voltage, normal
YES
NO
POWER
(POWER VOLTAGE)
Fig. 11
Q201 Emitter Waveform, normal
YES
NO
Q201
Fig. 12
R239,240 Rear Pin Waveform normal
YES
NO
Table 6
U3, Pin 4 Voltage, normal
YES
Q202,203, 204,205, 206,207
NO
Fig. 2
P10 Pin7,9,10 Signal, normal
YES
U3
NO
R/O
Fig. 13
Q222,223 Base Signal, normal
YES
NO
Table 6
U3, Pin2,3 Voltage, normal
YES
Q210,211 K201,202
NO
Fig. 2
P10, Pin7,9,10 Signal, normal
YES
U3
NO
R/O
Fig. 14
Q217,218 Collector Signal, normal
YES
NO
Variable operation normal
YES
Q212,213, 214,215, 216, 217, 218 U201a
NO
P10, Pin12 Voltage, normal
YES
U202
NO
PANEL
Fig. 15
Q505,506, Emitter Signal, normal
YES
NO
Q219,220, Q505,506
Vertical Position Operation normal
YES
NO
Table 8
P10, Pin16 Voltage, normal
YES
Q507,508
NO
PANEL
1


1
Fig. 3
U9 Pin3,11,8 U7, Pin8 Signal, normal
YES
NO
Fig. 3
P10 Pin8 Waveform, normal
YES
NO
V-CLK
Table 2
U1 Pin4,5,6,7 Voltage, normal
YES
U4,5,6,7,8, 9
NO
Fig. 2
P15 Pin 7,9,10 Waveform, normal
YES
U1
NO
R/O
Q528,529 Collector Waveform, normal
YES
END
(only CH2 SELECT)
NO
Q3,4,528, 529 D501,502, 503,504, 505,506, 507,508, 509

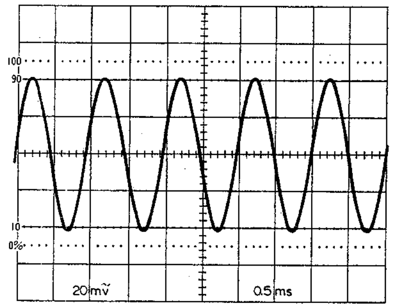


Fig. 11 DC +6V

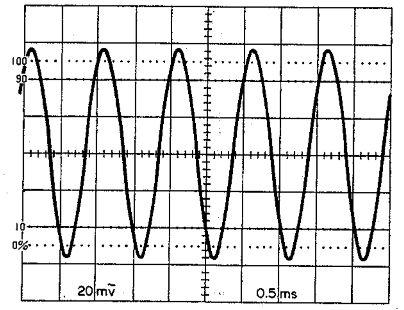


Fig. 12 DC −1.8V

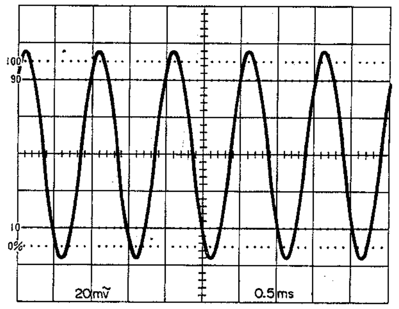


Fig. 13 DC −1.8V

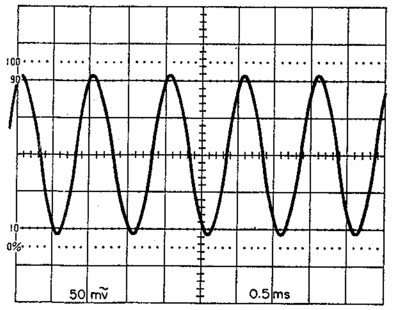


Fig. 14 DC +4.8V

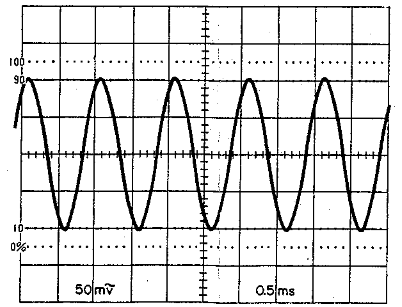
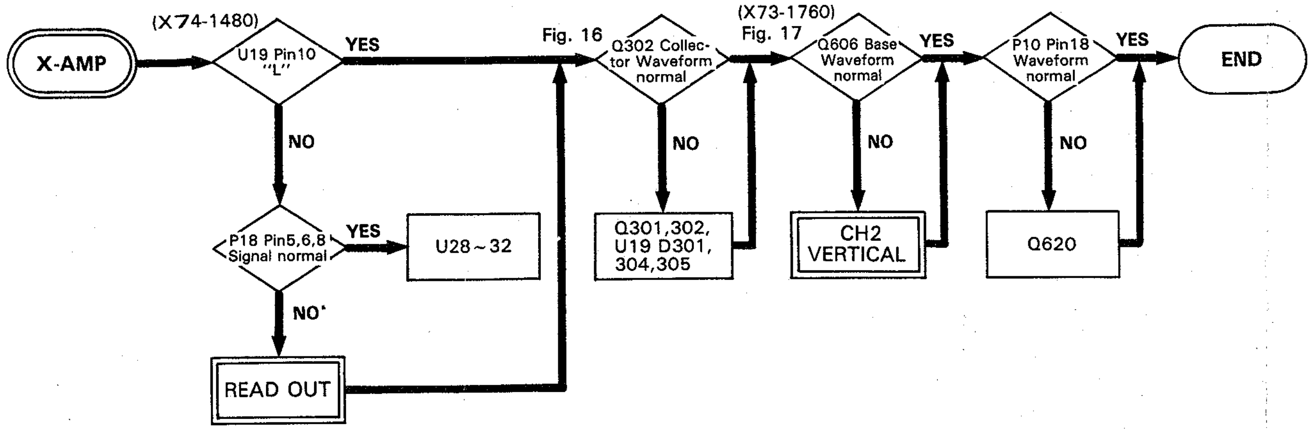


Fig. 15 DC +4.8V

TROUBLESHOOTING


X-AMP
(X74-1480)
U19 Pin10 "L"
YES
NO
P18 Pin5,6,8 Signal normal
YES
U28~32
NO
READ OUT
Fig. 16
Q302 Collector Waveform normal
NO
Q301,302, U19 D301, 304,305
(X73-1760)
Fig. 17
Q606 Base Waveform normal
YES
NO
CH2 VERTICAL
P10 Pin18 Waveform normal
YES
NO
Q620
END

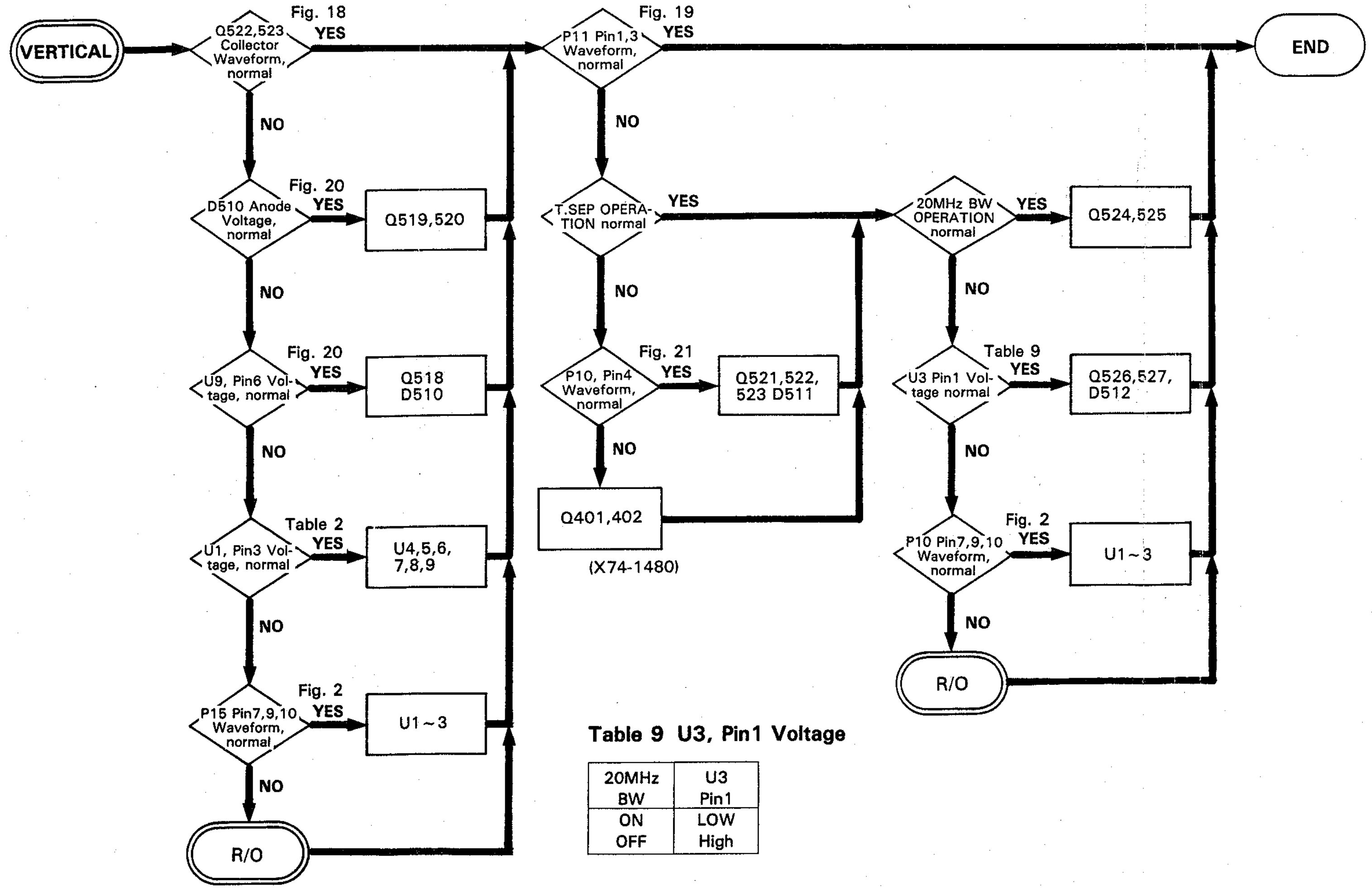

VERTICAL
Q522,523 Collector Waveform, normal
Fig. 18
YES
NO
D510 Anode Voltage, normal
Fig. 20
YES
Q519,520
NO
U9, Pin6 Voltage, normal
Fig. 20
YES
Q518 D510
NO
U1, Pin3 Voltage, normal
Table 2
YES
U4,5,6, 7,8,9
NO
P15 Pin7,9,10 Waveform, normal
Fig. 2
YES
U1~3
NO
R/O
P11 Pin1,3 Waveform, normal
Fig. 19
YES
END
NO
T.SEP OPERATION normal
YES
NO
P10, Pin4 Waveform, normal
Fig. 21
YES
Q521,522, 523 D511
NO
Q401,402
(X74-1480)
20MHz BW OPERATION normal
YES
Q524,525
NO
U3 Pin1 Voltage normal
Table 9
YES
Q526,527, D512
NO
P10 Pin7,9,10 Waveform, normal
Fig. 2
YES
U1~3
NO
R/O

Table 9 U3, Pin1 Voltage

20MHz BW	U3 Pin1
ON	LOW
OFF	High

H-MODE "X-Y"
Input: 40mVp-p 1kHz
Sine Wave
Volts/div: 5mV/div

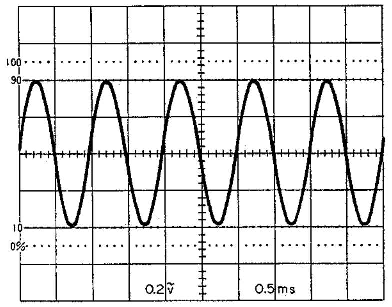


Fig. 16 DC +2.4V

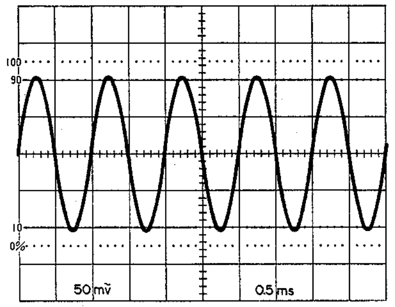


Fig. 17 DC +5V

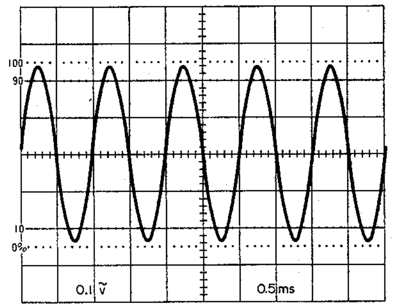


Fig. 18 DC −5.0V

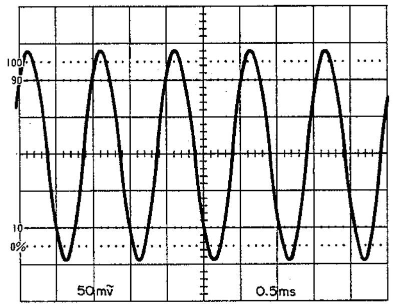
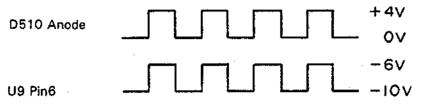
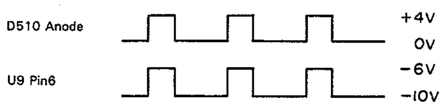


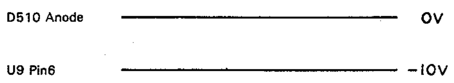
Fig. 19 DC +5V



(a) V-MODE "ADD" + The other one

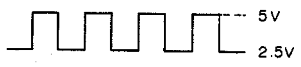


(b) V-MODE "ADD" + CH × 2

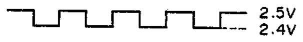


(c) V-MODE "ADD" is not selected

Fig. 20 D510 Anode, U9, Pin6 Waveform



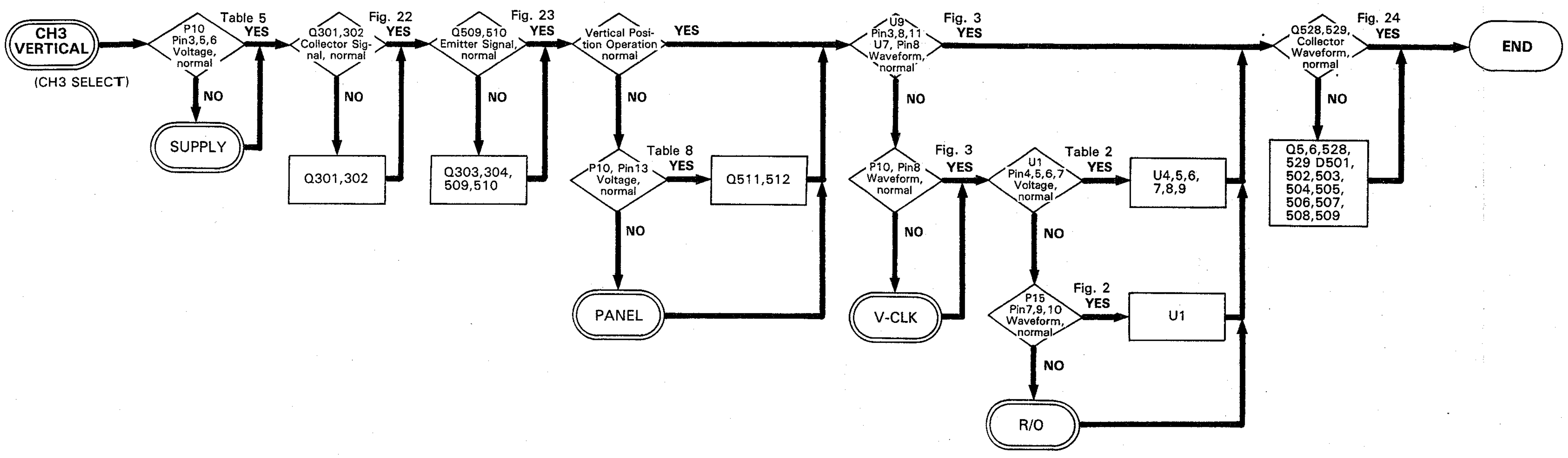
(a) T. SEP FULLY CCW

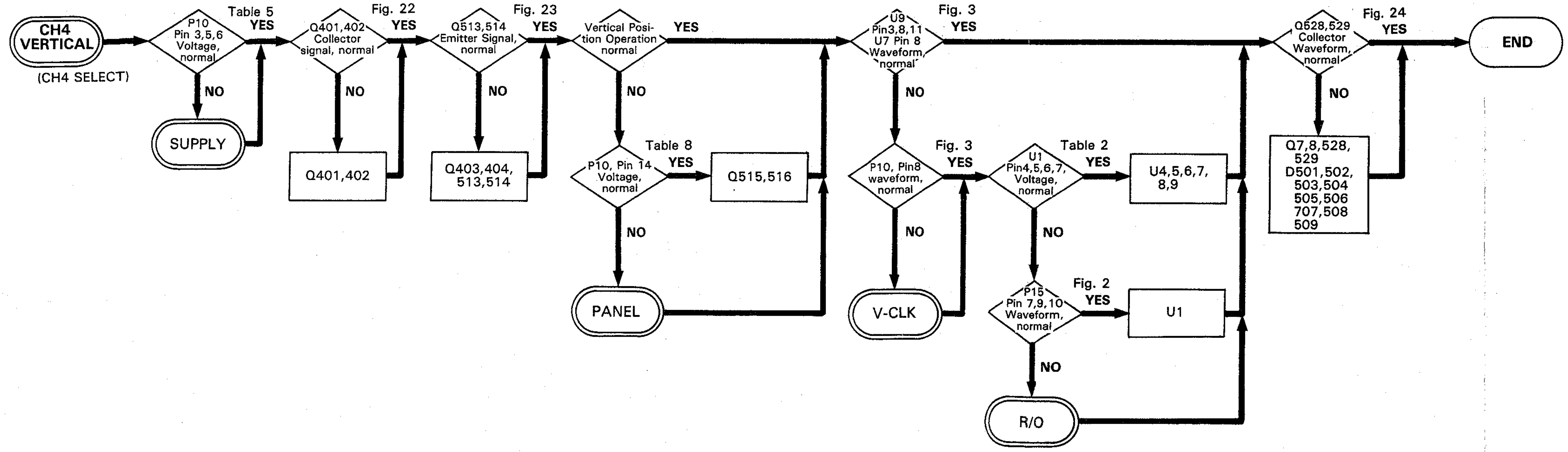


(b) T. SEP FULLY CW

Fig. 21 T. SEP. P10 Pin4 Waveform H-MODE "ALT"

TROUBLESHOOTING


CH3 VERTICAL
(CH3 SELECT)
P10 Pin3,5,6 Voltage, normal
Table 5
YES
NO
SUPPLY
Q301,302 Collector Signal, normal
Fig. 22
YES
NO
Q301,302
Q509,510 Emitter Signal, normal
Fig. 23
YES
NO
Q303,304, 509,510
Vertical Position Operation normal
YES
NO
P10, Pin13 Voltage, normal
Table 8
YES
NO
Q511,512
PANEL
U9 Pin3,8,11 U7, Pin8 Waveform, normal
Fig. 3
YES
NO
P10, Pin8 Waveform, normal
Fig. 3
YES
NO
V-CLK
U1 Pin4,5,6,7 Voltage, normal
Table 2
YES
NO
U4,5,6, 7,8,9
P15 Pin7,9,10 Waveform, normal
Fig. 2
YES
NO
U1
R/O
Q528,529, Collector Waveform, normal
Fig. 24
YES
NO
Q5,6,528, 529 D501, 502,503, 504,505, 506,507, 508,509
END


CH4 VERTICAL
(CH4 SELECT)
P10 Pin 3,5,6 Voltage, normal
Table 5
YES
NO
SUPPLY
Q401,402 Collector signal, normal
Fig. 22
YES
NO
Q401,402
Q513,514 Emitter Signal, normal
Fig. 23
YES
NO
Q403,404, 513,514
Vertical Position Operation normal
YES
NO
P10, Pin 14 Voltage, normal
Table 8
YES
NO
Q515,516
PANEL
U9 Pin3,8,11 U7 Pin 8 Waveform, normal
Fig. 3
YES
NO
P10, Pin8 waveform, normal
Fig. 3
YES
NO
V-CLK
U1 Pin4,5,6,7, Voltage, normal
Table 2
YES
NO
U4,5,6,7, 8,9
P15 Pin 7,9,10 Waveform, normal
Fig. 2
YES
NO
U1
R/O
Q528,529 Collector Waveform, normal
Fig. 24
YES
NO
Q7,8,528, 529 D501,502, 503,504 505,506 707,508 509
END

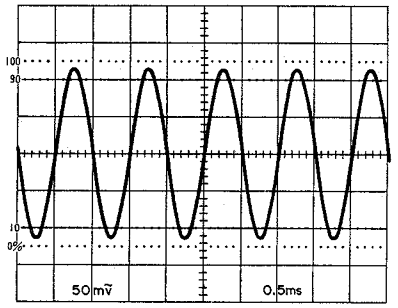


Fig. 22 DC −5.0V

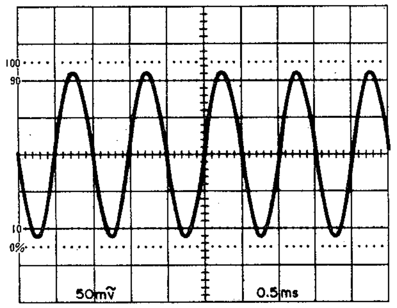


Fig. 23 DC +5.0V

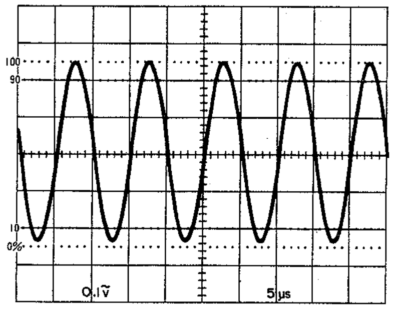
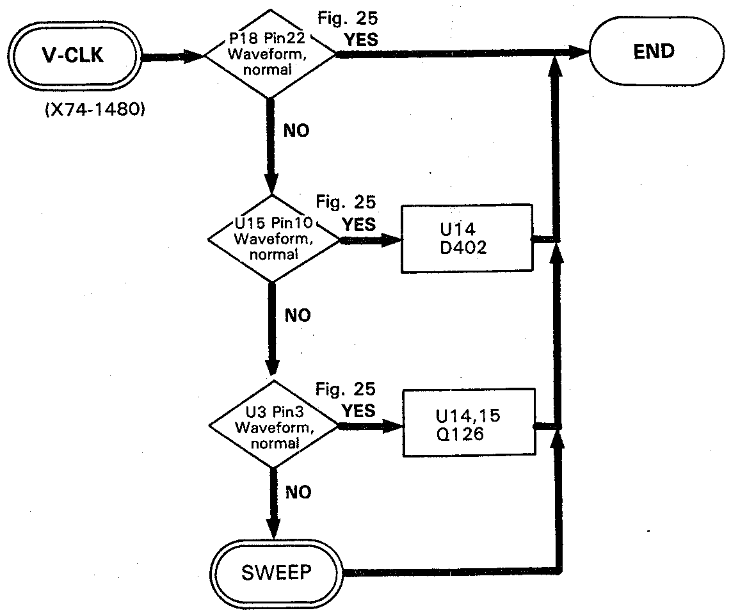
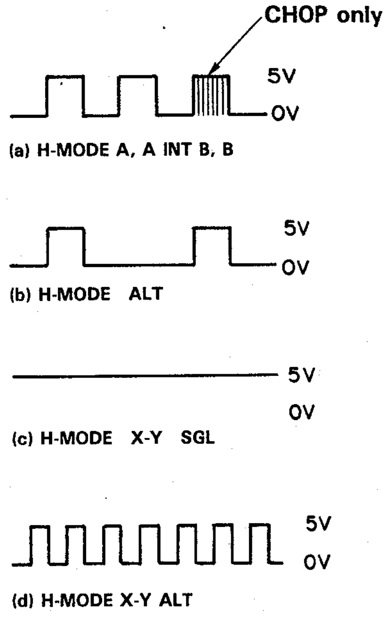


Fig. 24 DC −5.0V
Input 0.8Vp-p Sine Wave

TROUBLESHOOTING



V-CLK
(X74-1480)
P18 Pin22 Waveform, normal
Fig. 25
YES
END
NO
U15 Pin10 Waveform, normal
Fig. 25
YES
U14
D402
NO
U3 Pin3 Waveform, normal
Fig. 25
YES
U14,15
Q126
NO
SWEEP



CHOP only
5V
0V

(a) H-MODE A, A INT B, B

(b) H-MODE ALT

(c) H-MODE X-Y SGL

(d) H-MODE X-Y ALT

Fig. 25 Waveform

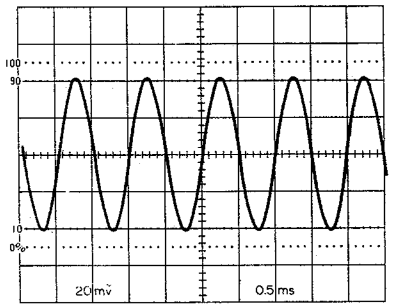
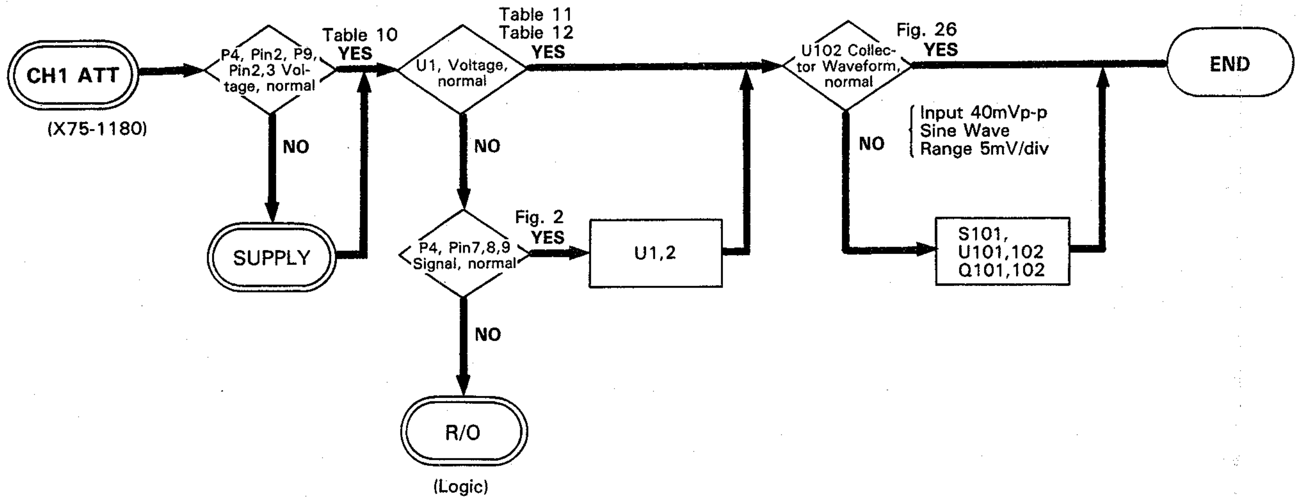


Fig. 26 DC +5V



CH1 ATT
(X75-1180)
P4, Pin2, P9, Pin2,3 Voltage, normal
Table 10
YES
NO
SUPPLY
U1, Voltage, normal
Table 11
Table 12
YES
NO
P4, Pin7,8,9 Signal, normal
Fig. 2
YES
U1,2
NO
R/O
(Logic)
U102 Collector Waveform, normal
Fig. 26
YES
NO
Input 40mVp-p
Sine Wave
Range 5mV/div
S101,
U101,102
Q101,102
END

Table 10 INPUT Voltage

Ref. No.	Pin No.	Voltage [V]
P4	2	+5
P9	2	−10
P9	3	+10

Table 11

Volts/div	X75-1180		X73-1760			
	1/10 ATT	1/100 ATT	×5 Amp	×1 Amp	1/2 ATT	1/4 ATT
1mV			○			
2			○		○	
5				○		
10				○	○	
20				○	○	○
50	○			○		
0.1V	○			○	○	
0.2	○			○	○	○
0.5		○		○		
1.0		○		○	○	
2.0		○		○	○	○
5.0	○	○		○		

Table 12 U1, U2 FUNCTION

Pin No.	U1	U2
1	CH2 GND	
2	CH2 1/10	CH3 1/5
3	CH2 1/100	CH4 1/5
4	CH1 AC/DC	CH2 INV
5	CH1 GND	
6	CH1 1/10	
7	CH1 1/100	
15	CH2 AC/DC	

TROUBLESHOOTING

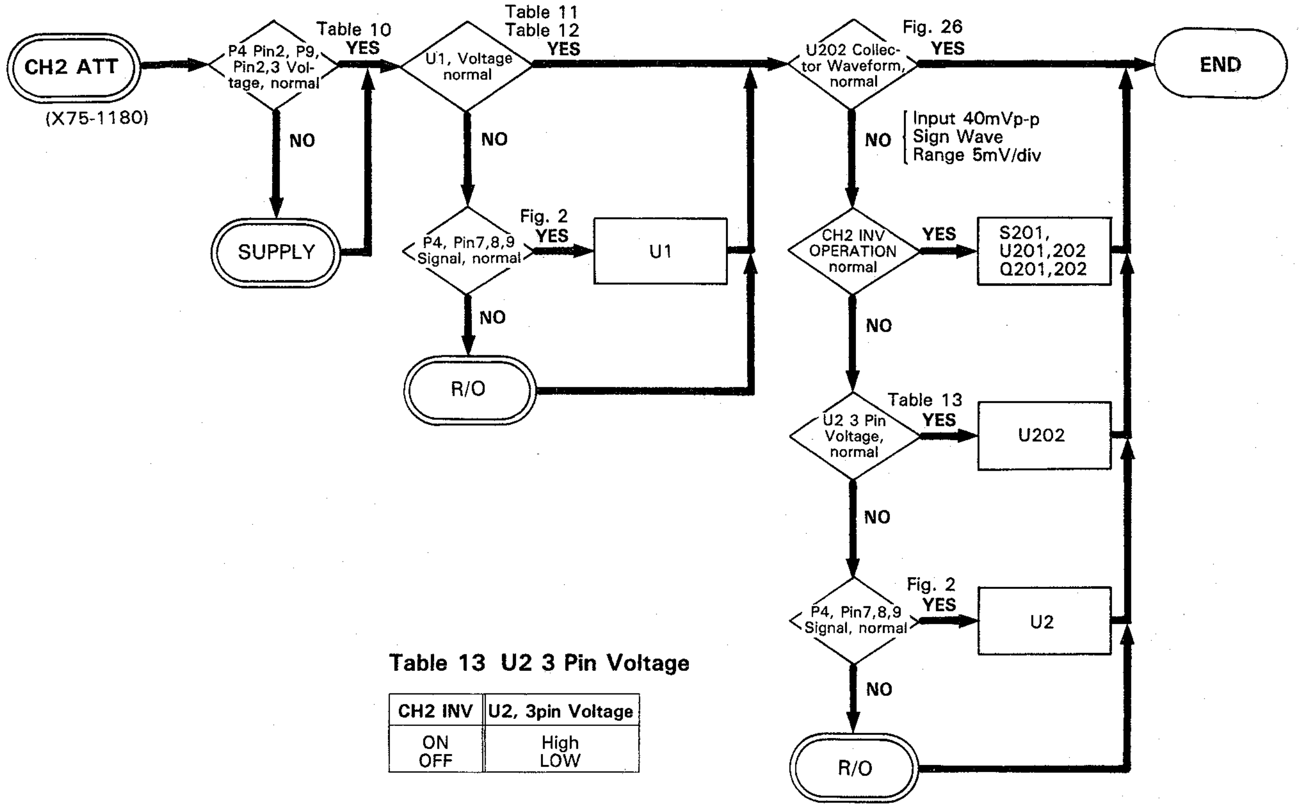

CH2 ATT
(X75-1180)
P4 Pin2, P9, Pin2,3 Voltage, normal
Table 10
YES
NO
SUPPLY
U1, Voltage normal
Table 11
Table 12
YES
NO
P4, Pin7,8,9 Signal, normal
Fig. 2
YES
U1
NO
R/O
U202 Collector Waveform, normal
Fig. 26
YES
END
NO
Input 40mVp-p
Sign Wave
Range 5mV/div
CH2 INV OPERATION normal
YES
S201, U201,202 Q201,202
NO
U2 3 Pin Voltage, normal
Table 13
YES
U202
NO
P4, Pin7,8,9 Signal, normal
Fig. 2
YES
U2
NO
R/O

Table 13 U2 3 Pin Voltage

CH2 INV	U2, 3pin Voltage
ON	High
OFF	LOW

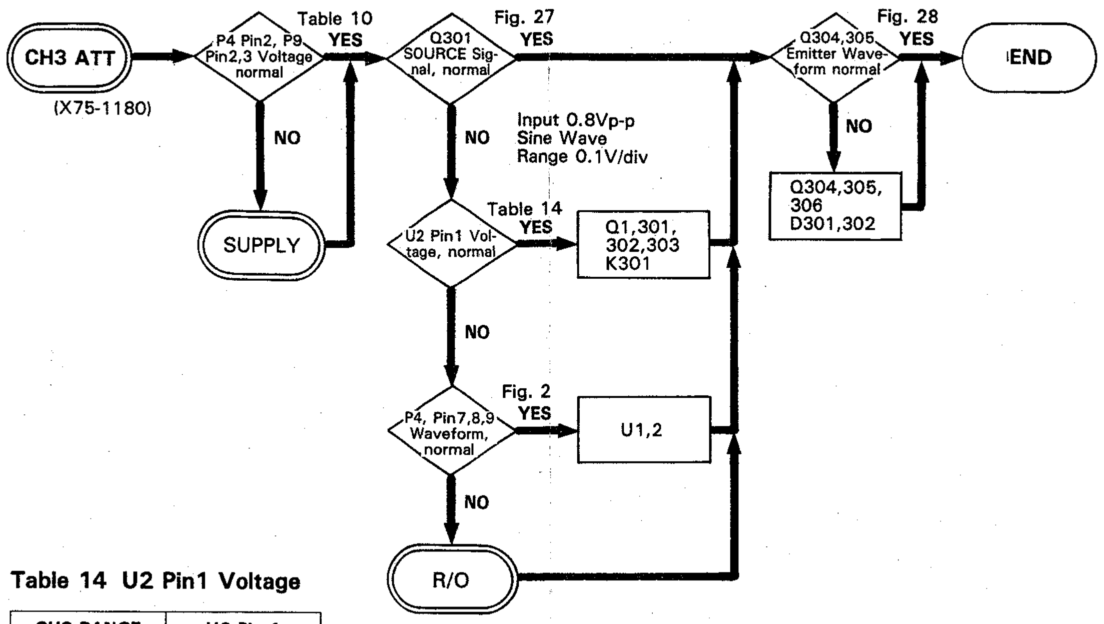

CH3 ATT
(X75-1180)
P4 Pin2, P9, Pin2,3 Voltage normal
Table 10
YES
NO
SUPPLY
Q301 SOURCE Signal, normal
Fig. 27
YES
NO
Input 0.8Vp-p
Sine Wave
Range 0.1V/div
U2 Pin1 Voltage, normal
Table 14
YES
Q1,301, 302,303 K301
NO
P4, Pin7,8,9 Waveform, normal
Fig. 2
YES
U1,2
NO
R/O
Q304,305 Emitter Waveform normal
Fig. 28
YES
END
NO
Q304,305, 306 D301,302

Table 14 U2 Pin1 Voltage

CH3 RANGE	U2 Pin 1
0.5 V/div	High
0.1 V/div	LOW

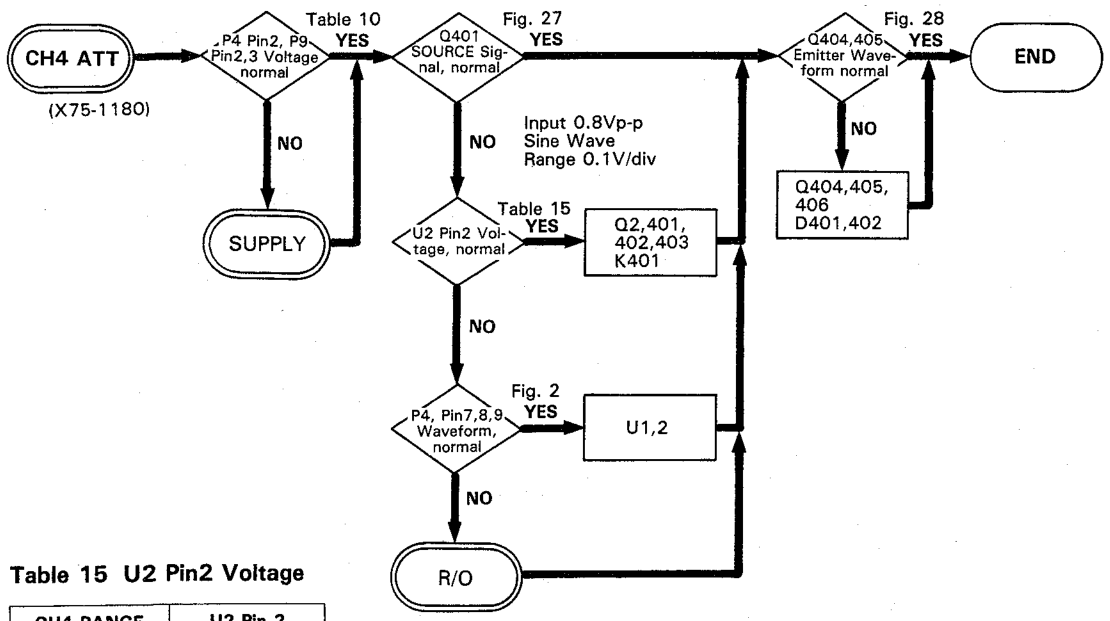

CH4 ATT
(X75-1180)
P4 Pin2, P9 Pin2,3 Voltage normal
Table 10
YES
NO
SUPPLY
Q401 SOURCE Signal, normal
Fig. 27
YES
NO
Input 0.8Vp-p
Sine Wave
Range 0.1V/div
U2 Pin2 Voltage, normal
Table 15
YES
Q2,401, 402,403 K401
NO
P4, Pin7,8,9 Waveform, normal
Fig. 2
YES
U1,2
NO
R/O
Q404,405 Emitter Waveform normal
Fig. 28
YES
END
NO
Q404,405, 406 D401,402

Table 15 U2 Pin2 Voltage

CH4 RANGE	U2 Pin 2
0.5 V/div	High
0.1 V/div	LOW

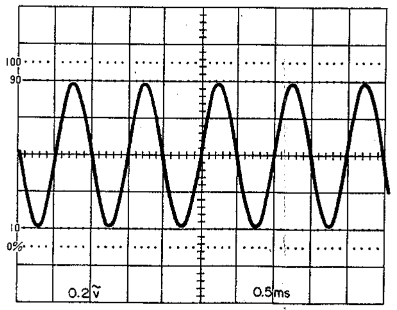


Fig. 27 DC −0.27 V

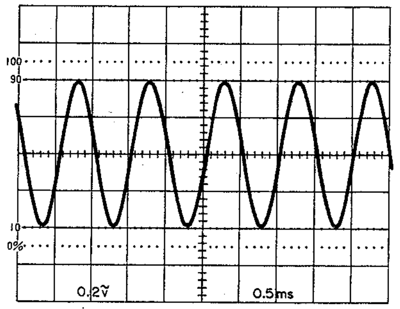


Fig. 28 DC −1.0 V

TROUBLESHOOTING

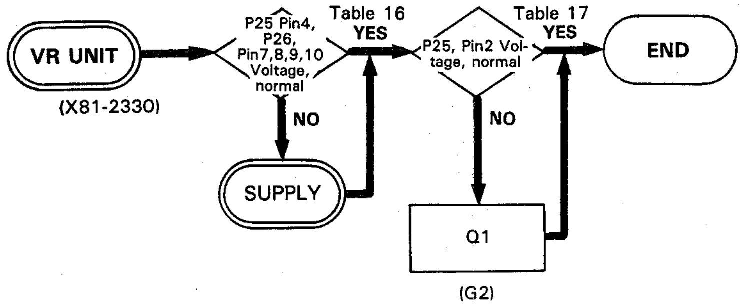

VR UNIT
(X81-2330)
P25 Pin4, P26, Pin7,8,9,10 Voltage, normal
Table 16
YES
NO
SUPPLY
P25, Pin2 Voltage, normal
Table 17
YES
NO
Q1
(G2)
END

Table 16 Voltage

P25 Pin No.	Voltage [V]
4	+140
P26 Pin No.	**Voltage [V]**
7	+10
8	−10
9	+13
10	−13

Table 17 Voltage

P25	Voltage [V]
Pin 2	+20

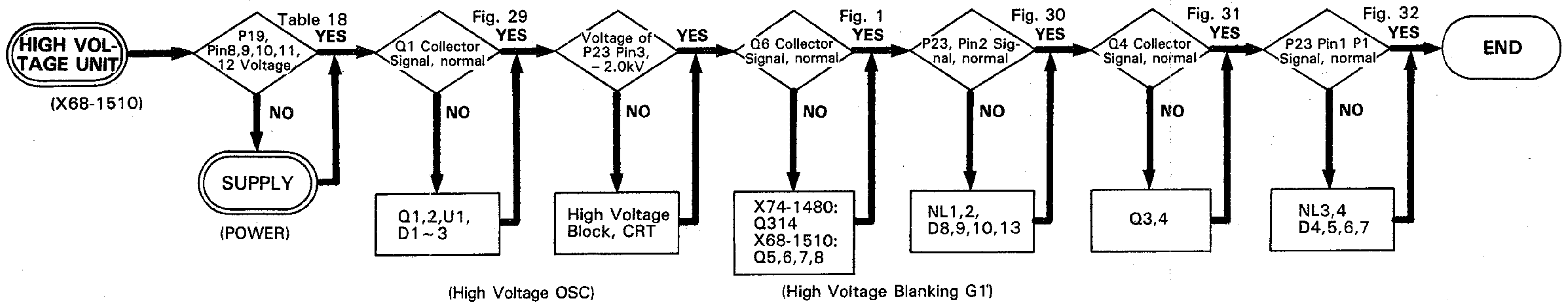

HIGH VOLTAGE UNIT
(X68-1510)
P19, Pin8,9,10,11, 12 Voltage
Table 18
YES
NO
SUPPLY
(POWER)
Q1 Collector Signal, normal
Fig. 29
YES
NO
Q1,2,U1, D1~3
Voltage of P23 Pin3, −2.0kV
YES
NO
High Voltage Block, CRT
(High Voltage OSC)
Q6 Collector Signal, normal
Fig. 1
YES
NO
X74-1480: Q314 X68-1510: Q5,6,7,8
P23, Pin2 Signal, normal
Fig. 30
YES
NO
NL1,2, D8,9,10,13
(High Voltage Blanking G1')
Q4 Collector Signal, normal
Fig. 31
YES
NO
Q3,4
P23 Pin1 P1 Signal, normal
Fig. 32
YES
NO
NL3,4 D4,5,6,7
END

Table 18

P19 Pin No.	Voltage [V]
8	+10
9	−10
10	+13
11	−13
12	+140

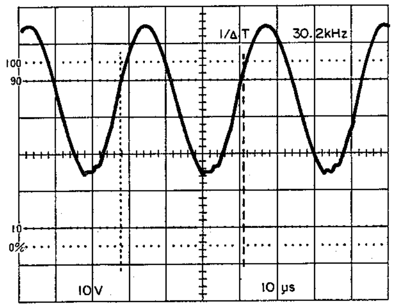


Fig. 29 Q1, Collector Waveform

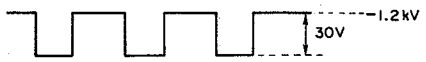


Fig. 30 G1, P23, Pin2

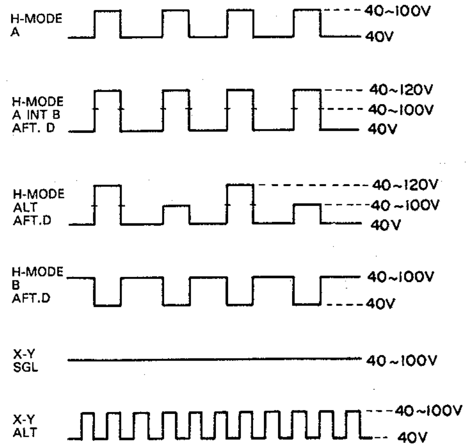

H-MODE A
40~100V
40V
H-MODE A INT B AFT. D
40~120V
40~100V
40V
H-MODE ALT AFT.D
40~120V
40~100V
40V
H-MODE B AFT.D
40~100V
40V
X-Y SGL
40~100V
X-Y ALT
40~100V
40V

Fig. 31 Q4, Collector Signal

A SWEEP TIME = B SWEEP TIME
DELAY TIME MIN

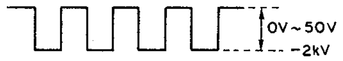


Fig. 32 P1, P23, Pin1 Signal

TROUBLESHOOTING

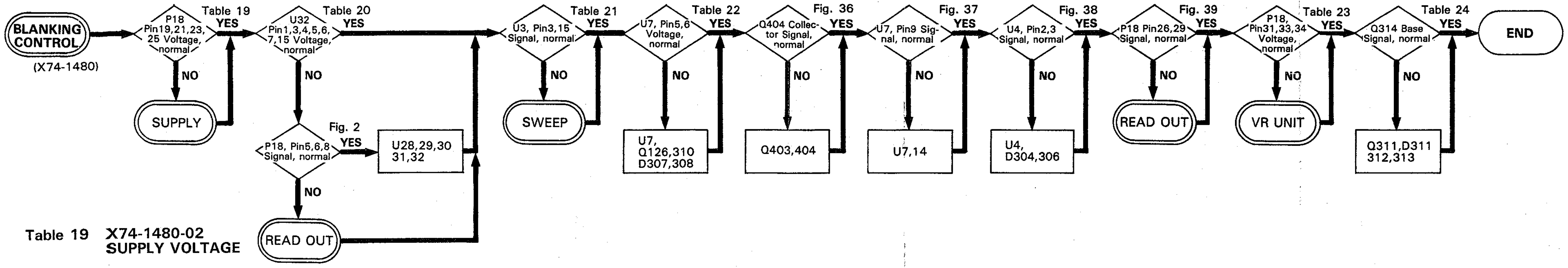

BLANKING CONTROL
(X74-1480)
P18 Pin19,21,23, 25 Voltage, normal
Table 19
YES
NO
SUPPLY
U32 Pin1,3,4,5,6, 7,15 Voltage, normal
Table 20
YES
NO
P18, Pin5,6,8 Signal, normal
Fig. 2
YES
U28,29,30 31,32
NO
READ OUT
U3, Pin3,15 Signal, normal
Table 21
YES
NO
SWEEP
U7, Pin5,6 Voltage, normal
Table 22
YES
NO
U7, Q126,310 D307,308
Q404 Collector Signal, normal
Fig. 36
YES
NO
Q403,404
U7, Pin9 Signal, normal
Fig. 37
YES
NO
U7,14
U4, Pin2,3 Signal, normal
Fig. 38
YES
NO
U4, D304,306
P18 Pin26,29 Signal, normal
Fig. 39
YES
NO
READ OUT
P18, Pin31,33,34 Voltage, normal
Table 23
YES
NO
VR UNIT
Q314 Base Signal, normal
Table 24
YES
NO
Q311,D311 312,313
END

Table 19 X74-1480-02 SUPPLY VOLTAGE

P18	Voltage [V]
Pin 19	+ 5
Pin 21	+ 5
Pin 23	+10
Pin 25	−10

Table 20 U32 Pin VOLTAGE

HORIZ DISPLAY MODE		ALT Pin1	B Pin3	XY SGL Pin4	ATT. D Pin5	A Pin6	CHOP Pin15
A		H	H	L	H	L	V-MODE ALT "H"
A INT B	NORM	H	H	L	H	H	
	AFT. D	H	H	L	L	H	
ALT	NORM	L	H	L	H	H	V-MODE CHOP "L"
	AFT. D	L	H	L	L	H	
B	NORM	H	L	L	H	H	
	AFT. D	H	L	L	L	H	
X-Y	SINGLE	H	H	H	H	H	
	ALT	H	H	L	H	H	

Table 21 U3 Pin3, 15

HORIZ DISPLAY MODE		AS Pin3	BS Pin15
A		Fig. 33	H
A INT B	NORM	Fig. 33	H
	AFT. D	Fig. 34	←
ALT	NORM	Fig. 33	H
	AFT. D	Fig. 34	←
B	NORM	Fig. 33	H
	AFT. D	Fig. 34	←
X-Y SGL		H	H

Table 22 A $\overline{\text{STATE}}$, B $\overline{\text{STATE}}$

HORIZ DISPLAY MODE	B STATE U7 Pin 5	A STATE U7 Pin6
A	H	L
A INT B	H	L
ALT	_⊓_⊓	⊓_⊓_
B	L	H
X-Y	H	L

Table 23 A,B, R/O INTEN Voltage

	FULLY CW INTEN MAX ~ FULLY CCW INTEN MIN
A INTEN P18 Pin33	−10V ~ +10V
B INTEN P28 Pin34	−10V ~ +10V
R/O INTEN P18 Pin31	−10V ~ +10V

Table 24 Q314 Base Signal

HORIZ DISPLAY MODE	Q314 Base Signal
A	Fig. 35
A INT B AFT. D	Fig. 35
ALT AFT.D	Fig. 35
B AFT.D	Fig. 35
X-Y	0.5 ~ 1.8V

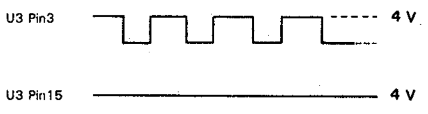


Fig. 33 HORIZ MODE "A"

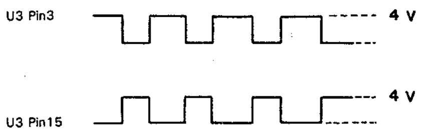


Fig. 34 HORIZ MODE "A INT B" "ALT"
AFT D, Delay time Min
B SWEEP TIME = A SWEEP TIME

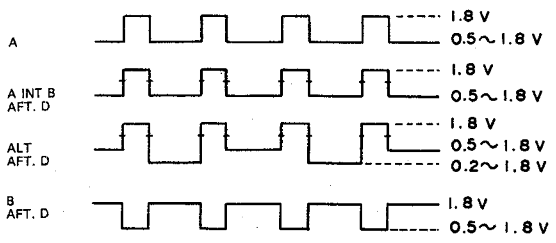


Fig. 35 Q314 Base Signal

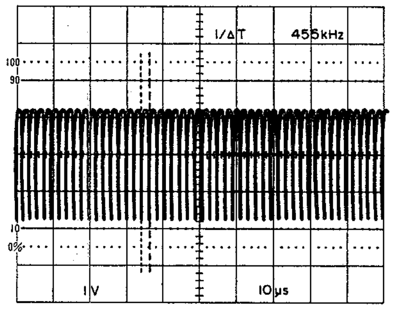
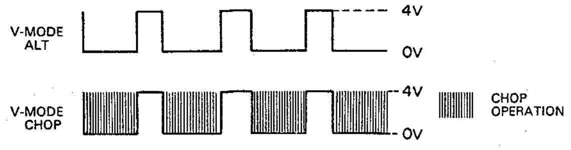
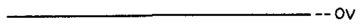


Fig. 36 Q404 Collector Signal

TROUBLESHOOTING

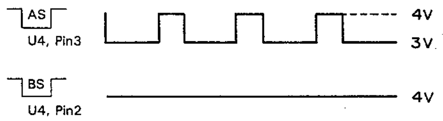

V-MODE ALT
4V
0V
V-MODE CHOP
4V
0V
CHOP OPERATION

(a) H-MODE "ALT"

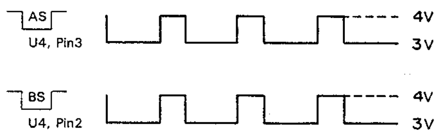


(b) H-MODE THE OTHER

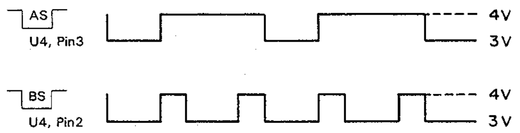
Fig. 37 U7, Pin9 Signal


AS
U4, Pin3
4V
3V
BS
U4, Pin2
4V

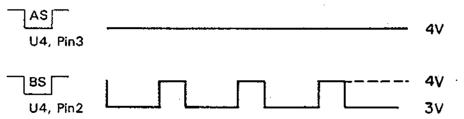
(a) H-MODE "A"


AS
U4, Pin3
4V
3V
BS
U4, Pin2
4V
3V

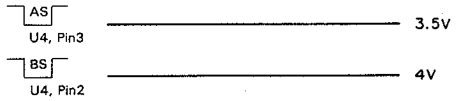
(b) H-MODE "A INT B"
A SWEEP TIME = B SWEEP TIME
DELAY TIME MIN


AS
U4, Pin3
4V
3V
BS
U4, Pin2
4V
3V

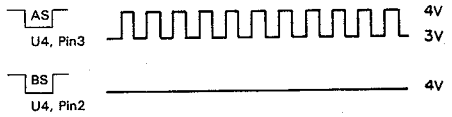
(c) H-MODE "ALT"
A SWEEP TIME = B SWEEP TIME
DELAY TIME MIN


AS
U4, Pin3
4V
BS
U4, Pin2
4V
3V

(d) H-MODE "D"
A SWEEP TIME = B SWEEP TIME
DELAY TIME MIN


AS
U4, Pin3
3.5V
BS
U4, Pin2
4V

(e) H-MODE "X-Y" SGL


AS
U4, Pin3
4V
3V
BS
U4, Pin2
4V

(f) H-MODE "X-Y" ALT

Fig. 38 U4, Pin2,3 Signal

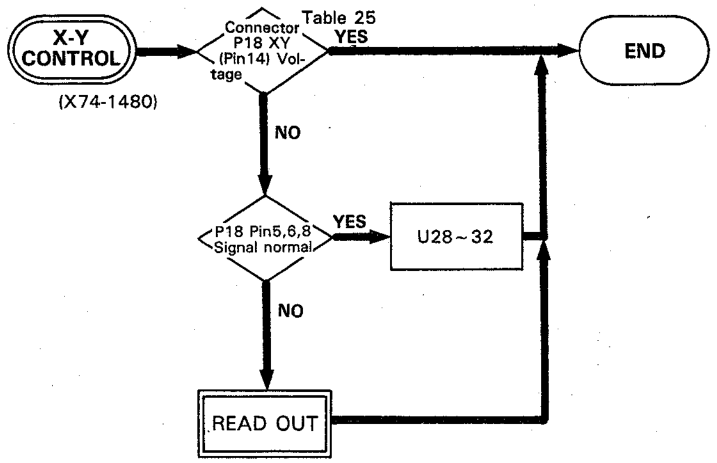
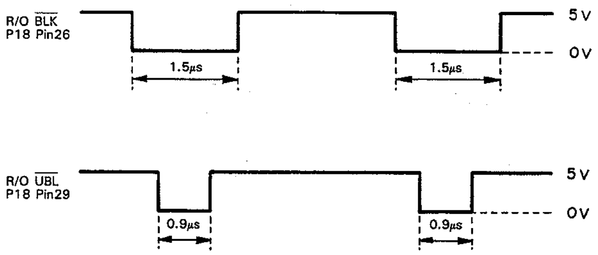
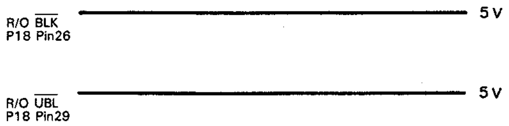

X-Y CONTROL
(X74-1480)
Connector P18 XY (Pin14) Voltage
Table 25
YES
END
NO
P18 Pin5,6,8 Signal normal
YES
U28~32
NO
READ OUT

Table 25 X-Y Signal

X-Y	P18 Pin14 X-Y
ON	L
OFF	H


R/O BLK
P18 Pin26
1.5μs
1.5μs
5V
0V
R/O UBL
P18 Pin29
0.9μs
0.9μs
5V
0V

(a) R/O ON


R/O BLK
P18 Pin26
5V
R/O UBL
P18 Pin29
5V

(b) R/O OFF

Fig. 39 P18 Pin26, 29, R/O $\overline{\text{BLK}}$, R/O $\overline{\text{UBL}}$ Signal

TROUBLESHOOTING

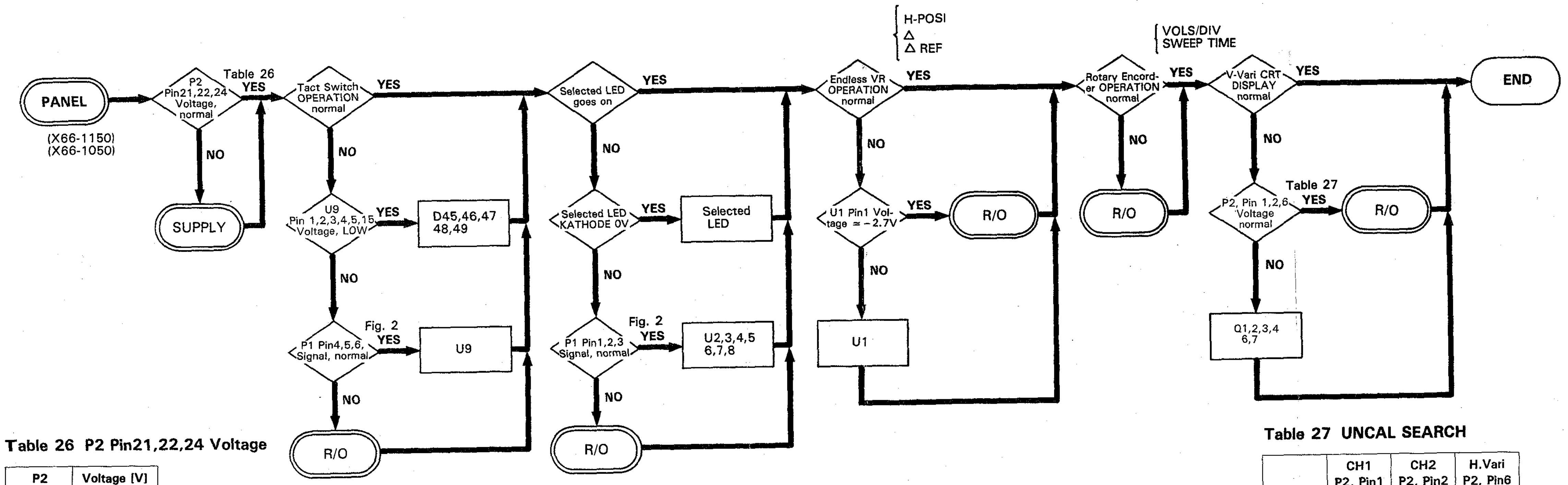

PANEL
(X66-1150)
(X66-1050)
P2 Pin21,22,24 Voltage, normal
Table 26
YES
NO
SUPPLY
Tact Switch OPERATION normal
YES
NO
U9 Pin 1,2,3,4,5,15 Voltage, LOW
YES
D45,46,47 48,49
NO
P1 Pin4,5,6, Signal, normal
Fig. 2
YES
U9
NO
R/O
Selected LED goes on
YES
NO
Selected LED KATHODE 0V
YES
Selected LED
NO
P1 Pin1,2,3 Signal, normal
Fig. 2
YES
U2,3,4,5 6,7,8
NO
R/O
H-POSI
△
△ REF
Endless VR OPERATION normal
YES
NO
U1 Pin1 Voltage ≃ −2.7V
YES
R/O
NO
U1
VOLS/DIV
SWEEP TIME
Rotary Encorder OPERATION normal
YES
NO
R/O
V-Vari CRT DISPLAY normal
YES
END
NO
P2, Pin 1,2,6 Voltage normal
Table 27
YES
R/O
NO
Q1,2,3,4 6,7

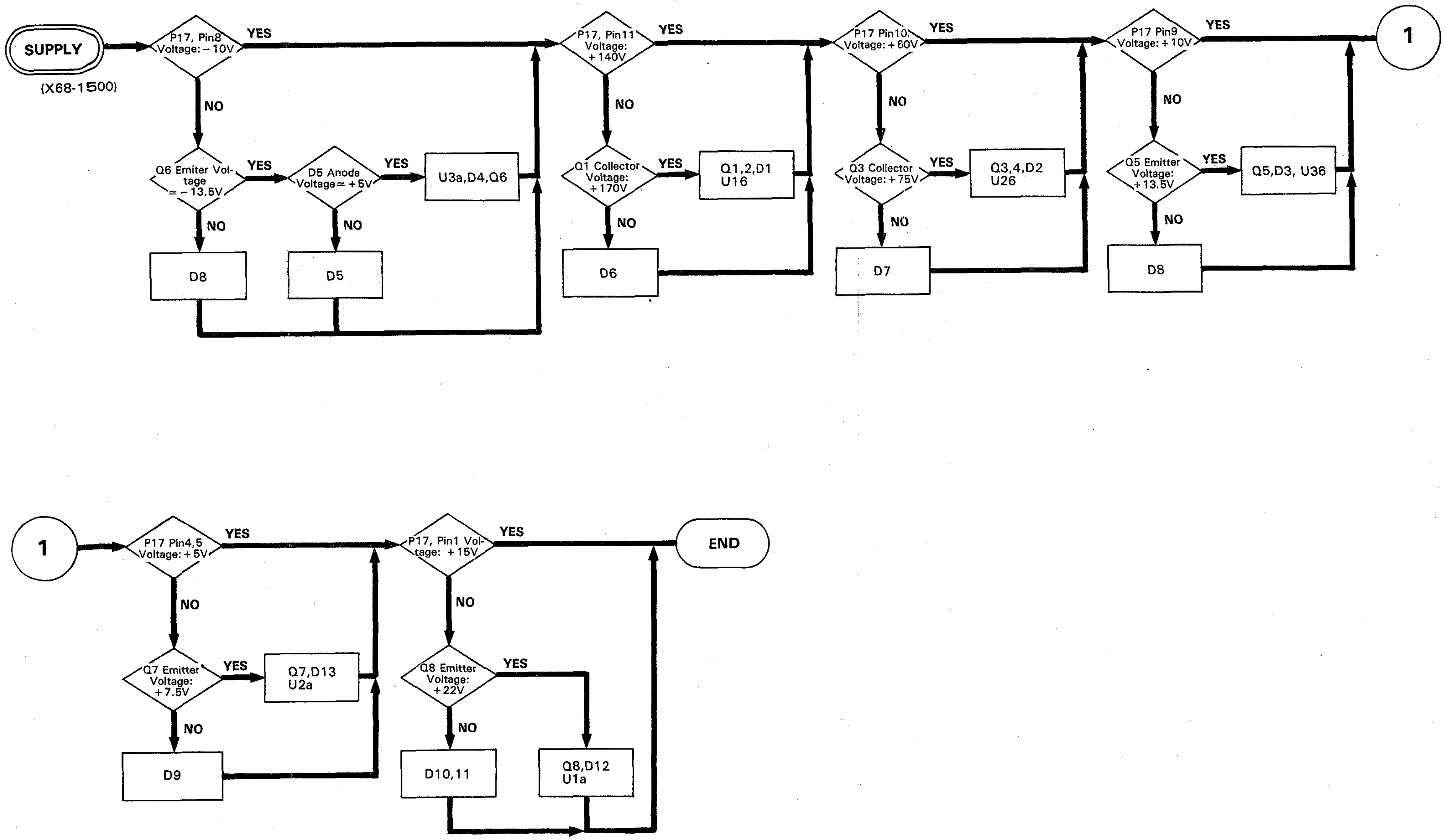
Table 26 P2 Pin21,22,24 Voltage

P2	Voltage [V]
Pin 21	+10
22	−10
24	+5

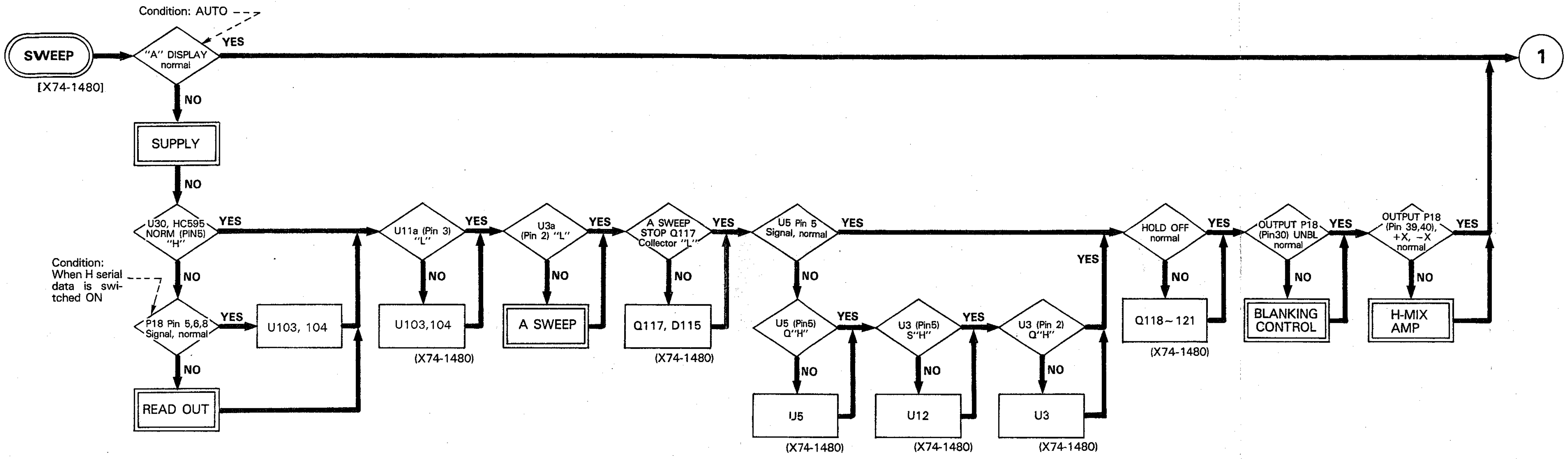
Table 27 UNCAL SEARCH

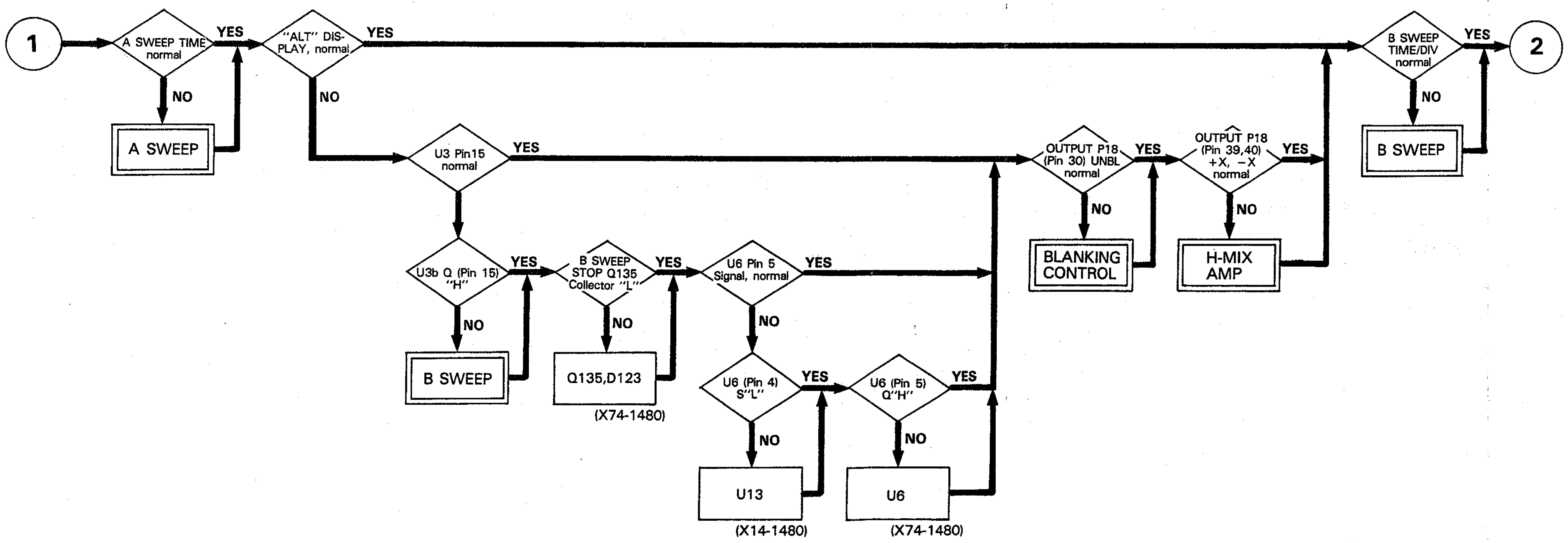
	CH1 P2, Pin1	CH2 P2, Pin2	H.Vari P2, Pin6
CAL	+0.12 [V]	+0.12 [V]	+4.85 [V]
UNCAL	+4.85 [V]	+4.85 [V]	+0.12 [V]

TROUBLESHOOTING

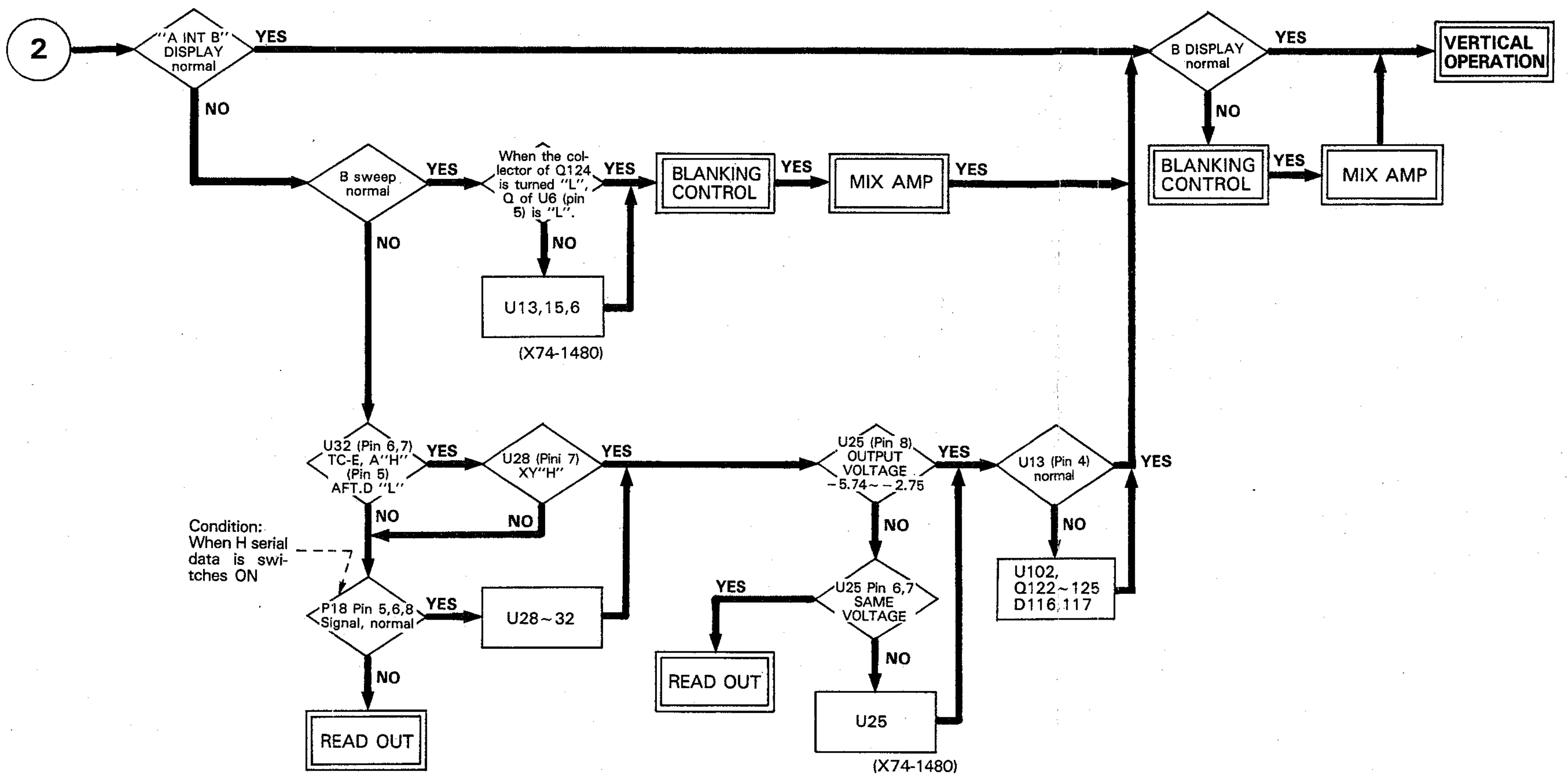

SUPPLY
(X68-1500)
P17, Pin8 Voltage: −10V
YES
NO
Q6 Emiter Voltage ≒ −13.5V
YES
NO
D8
D5 Anode Voltage ≒ +5V
YES
NO
D5
U3a,D4,Q6
P17, Pin11 Voltage: +140V
YES
NO
Q1 Collector Voltage: +170V
YES
NO
Q1,2,D1 U16
D6
P17 Pin10 Voltage: +60V
YES
NO
Q3 Collector Voltage: +75V
YES
NO
Q3,4,D2 U26
D7
P17 Pin9 Voltage: +10V
YES
NO
Q5 Emitter Voltage: +13.5V
YES
NO
Q5,D3, U36
D8
1
1
P17 Pin4,5 Voltage: +5V
YES
NO
Q7 Emitter Voltage: +7.5V
YES
NO
Q7,D13 U2a
D9
P17, Pin1 Voltage: +15V
YES
NO
Q8 Emitter Voltage: +22V
YES
NO
D10,11
Q8,D12 U1a
END

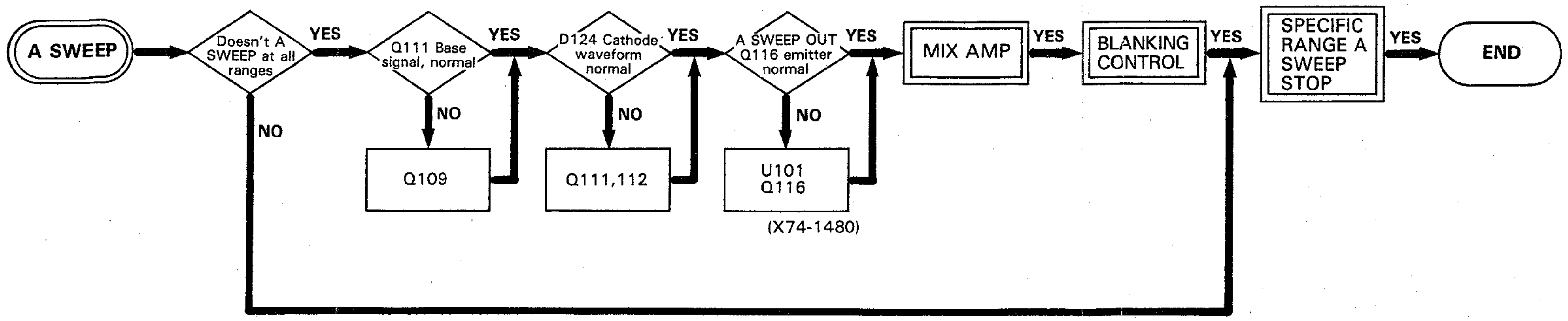
TROUBLESHOOTING


Condition: AUTO
SWEEP
[X74-1480]
"A" DISPLAY normal
YES
NO
SUPPLY
NO
U30, HC595 NORM (PIN5) "H"
YES
Condition: When H serial data is switched ON
P18 Pin 5,6,8 Signal, normal
YES
U103, 104
NO
READ OUT
U11a (Pin 3) "L"
YES
NO
U103,104
(X74-1480)
U3a (Pin 2) "L"
YES
NO
A SWEEP
A SWEEP STOP Q117 Collector "L"
YES
NO
Q117, D115
(X74-1480)
U5 Pin 5 Signal, normal
YES
NO
U5 (Pin5) Q"H"
YES
NO
U5
(X74-1480)
U3 (Pin5) S"H"
YES
NO
U12
(X74-1480)
U3 (Pin 2) Q"H"
NO
U3
(X74-1480)
YES
HOLD OFF normal
YES
NO
Q118～121
(X74-1480)
OUTPUT P18 (Pin30) UNBL normal
YES
NO
BLANKING CONTROL
OUTPUT P18 (Pin 39,40), +X, −X normal
YES
NO
H-MIX AMP
1

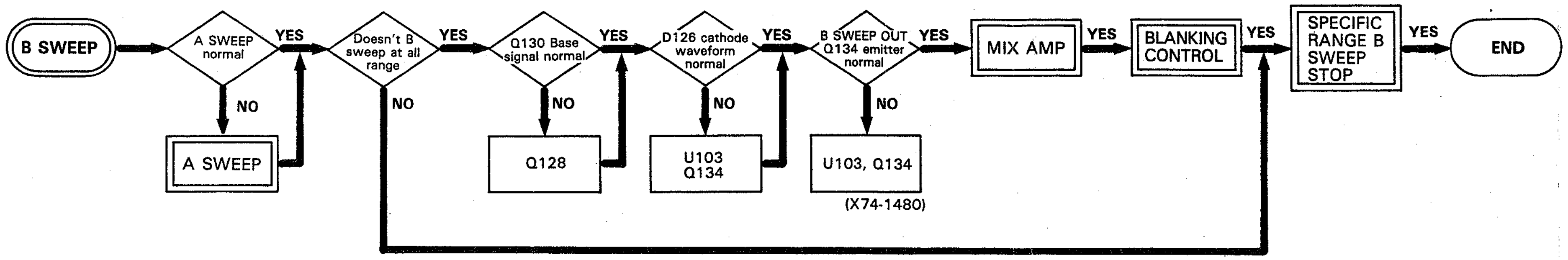

1
A SWEEP TIME normal
YES
NO
A SWEEP
"ALT" DISPLAY, normal
YES
NO
U3 Pin15 normal
YES
U3b Q (Pin 15) "H"
YES
NO
B SWEEP
B SWEEP STOP Q135 Collector "L"
YES
NO
Q135,D123
(X74-1480)
U6 Pin 5 Signal, normal
YES
NO
U6 (Pin 4) S"L"
YES
NO
U13
(X14-1480)
U6 (Pin 5) Q"H"
YES
NO
U6
(X74-1480)
OUTPUT P18 (Pin 30) UNBL normal
YES
NO
BLANKING CONTROL
OUTPUT P18 (Pin 39,40) +X, −X normal
YES
NO
H-MIX AMP
B SWEEP TIME/DIV normal
YES
NO
B SWEEP
2

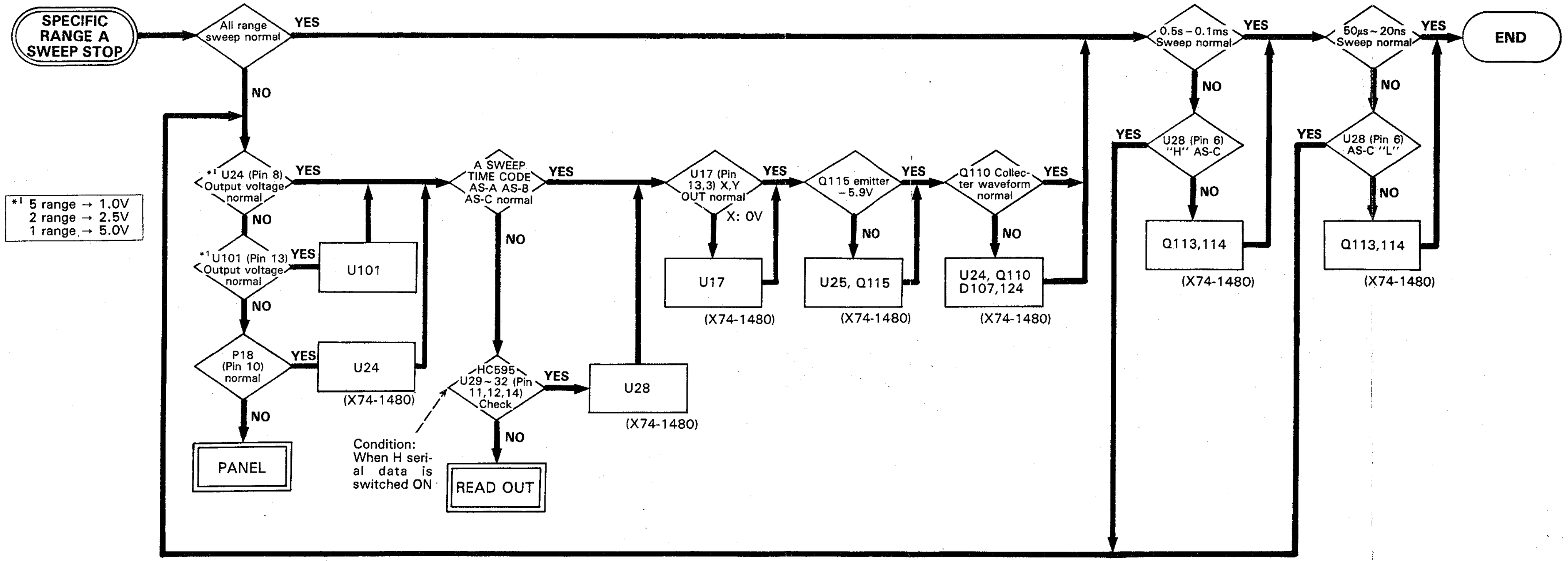
TROUBLESHOOTING

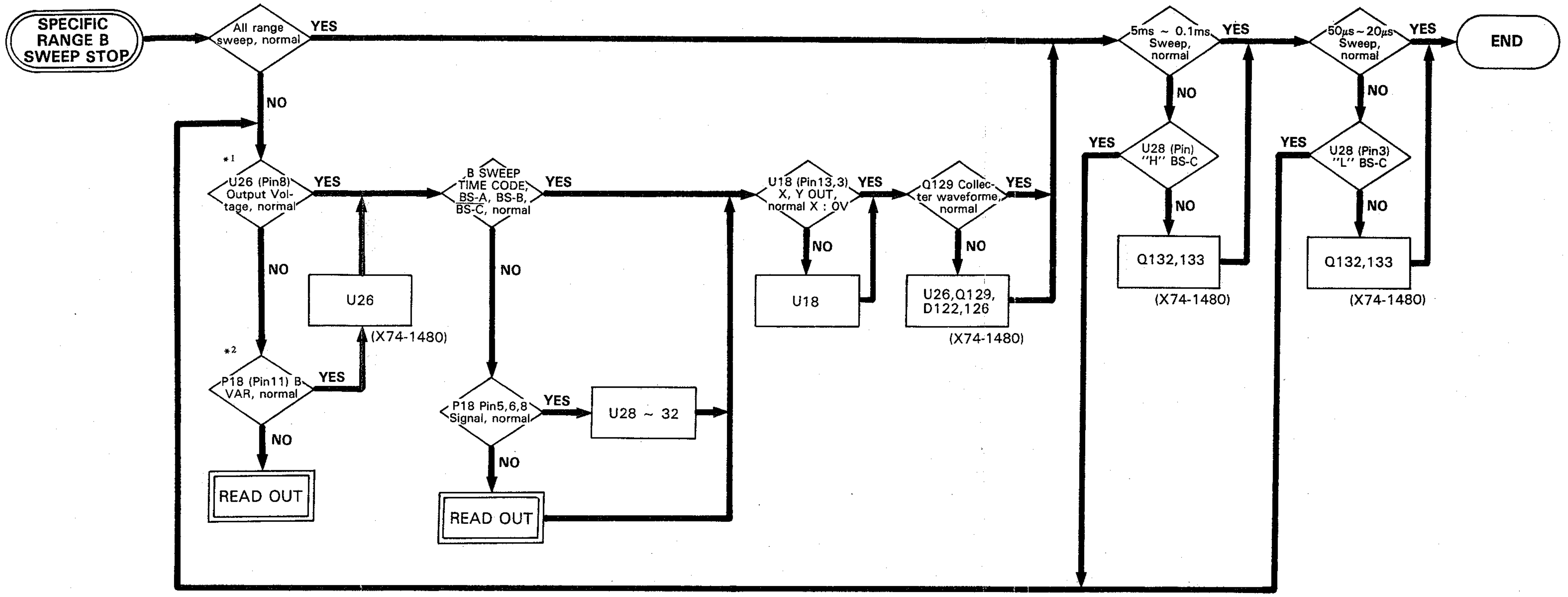

2
"A INT B" DISPLAY normal
YES
NO
B DISPLAY normal
YES
NO
VERTICAL OPERATION
BLANKING CONTROL
YES
MIX AMP
B sweep normal
YES
NO
When the collector of Q124 is turned "L", Q of U6 (pin 5) is "L".
YES
NO
BLANKING CONTROL
YES
MIX AMP
YES
U13,15,6
(X74-1480)
U32 (Pin 6,7) TC-E, A"H" (Pin 5) AFT.D "L"
YES
NO
U28 (Pini 7) XY"H"
YES
NO
U25 (Pin 8) OUTPUT VOLTAGE −5.74~−2.75
YES
NO
U13 (Pin 4) normal
YES
NO
U102, Q122~125 D116,117
Condition: When H serial data is swi-tches ON
P18 Pin 5,6,8 Signal, normal
YES
NO
U28~32
READ OUT
U25 Pin 6,7 SAME VOLTAGE
YES
NO
READ OUT
U25
(X74-1480)


A SWEEP
Doesn't A SWEEP at all ranges
YES
NO
Q111 Base signal, normal
YES
NO
Q109
D124 Cathode waveform normal
YES
NO
Q111,112
A SWEEP OUT Q116 emitter normal
YES
NO
U101 Q116
(X74-1480)
MIX AMP
YES
BLANKING CONTROL
YES
SPECIFIC RANGE A SWEEP STOP
YES
END

TROUBLESHOOTING


B SWEEP
A SWEEP normal
YES
NO
A SWEEP
Doesn't B sweep at all range
YES
NO
Q130 Base signal normal
YES
NO
Q128
D126 cathode waveform normal
YES
NO
U103
Q134
B SWEEP OUT Q134 emitter normal
YES
NO
U103, Q134
(X74-1480)
MIX AMP
YES
BLANKING CONTROL
YES
SPECIFIC RANGE B SWEEP STOP
YES
END


SPECIFIC RANGE A SWEEP STOP
All range sweep normal
YES
NO
*1 U24 (Pin 8) Output voltage normal
YES
NO
*1 5 range → 1.0V
2 range → 2.5V
1 range → 5.0V
*1 U101 (Pin 13) Output voltage normal
YES
U101
NO
P18 (Pin 10) normal
YES
U24
(X74-1480)
NO
PANEL
A SWEEP TIME CODE AS-A AS-B AS-C normal
YES
NO
HC595 U29~32 (Pin 11,12,14) Check
YES
U28
(X74-1480)
NO
READ OUT
Condition: When H serial data is switched ON
U17 (Pin 13,3) X,Y OUT normal
YES
X: 0V
U17
(X74-1480)
Q115 emitter −5.9V
YES
NO
U25, Q115
(X74-1480)
Q110 Collecter waveform normal
YES
NO
U24, Q110
D107,124
(X74-1480)
0.5s – 0.1ms Sweep normal
YES
NO
U28 (Pin 6) "H" AS-C
YES
NO
Q113,114
(X74-1480)
50μs ~ 20ns Sweep normal
YES
NO
U28 (Pin 6) AS-C "L"
YES
NO
Q113,114
(X74-1480)
END


SPECIFIC RANGE B SWEEP STOP
All range sweep, normal
YES
NO
*1
U26 (Pin8) Output Voltage, normal
YES
NO
U26
(X74-1480)
*2
P18 (Pin11) B-VAR, normal
YES
NO
READ OUT
B SWEEP TIME CODE, BS-A, BS-B, BS-C, normal
YES
NO
P18 Pin5,6,8 Signal, normal
YES
U28 ~ 32
NO
READ OUT
U18 (Pin13,3) X, Y OUT, normal X : 0V
YES
NO
U18
Q129 Collecter waveforme, normal
YES
NO
U26,Q129, D122,126
(X74-1480)
5ms ~ 0.1ms Sweep, normal
YES
NO
U28 (Pin) "H" BS-C
YES
NO
Q132,133
(X74-1480)
50μs ~ 20μs Sweep, normal
YES
NO
U28 (Pin3) "L" BS-C
YES
NO
Q132,133
(X74-1480)
END

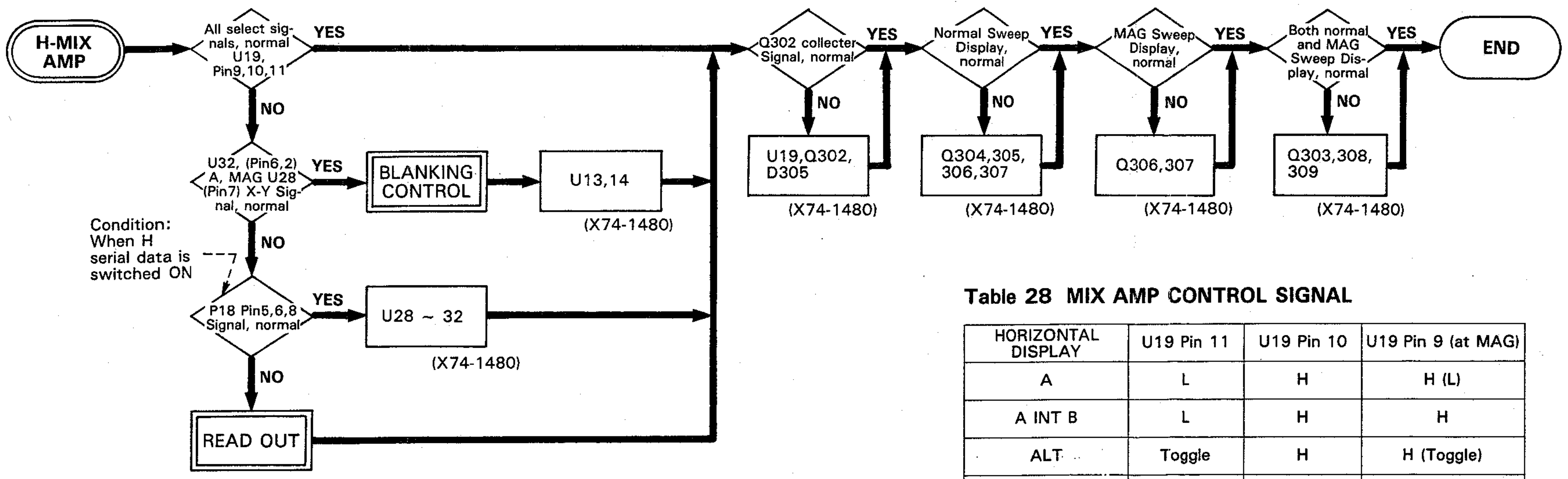
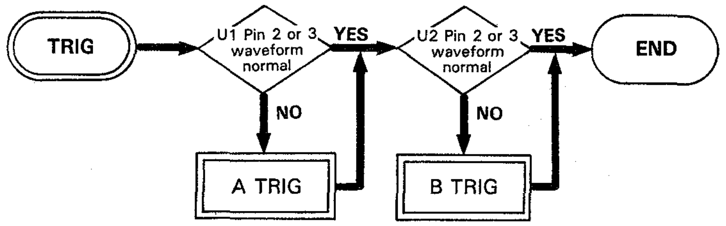

H-MIX AMP
All select signals, normal U19, Pin9,10,11
YES
NO
U32, (Pin6,2) A, MAG U28 (Pin7) X-Y Signal, normal
YES
BLANKING CONTROL
U13,14
(X74-1480)
Condition: When H serial data is switched ON
NO
P18 Pin5,6,8 Signal, normal
YES
U28 ~ 32
(X74-1480)
NO
READ OUT
Q302 collecter Signal, normal
YES
NO
U19,Q302, D305
(X74-1480)
Normal Sweep Display, normal
YES
NO
Q304,305, 306,307
(X74-1480)
MAG Sweep Display, normal
YES
NO
Q306,307
(X74-1480)
Both normal and MAG Sweep Display, normal
YES
NO
Q303,308, 309
(X74-1480)
END

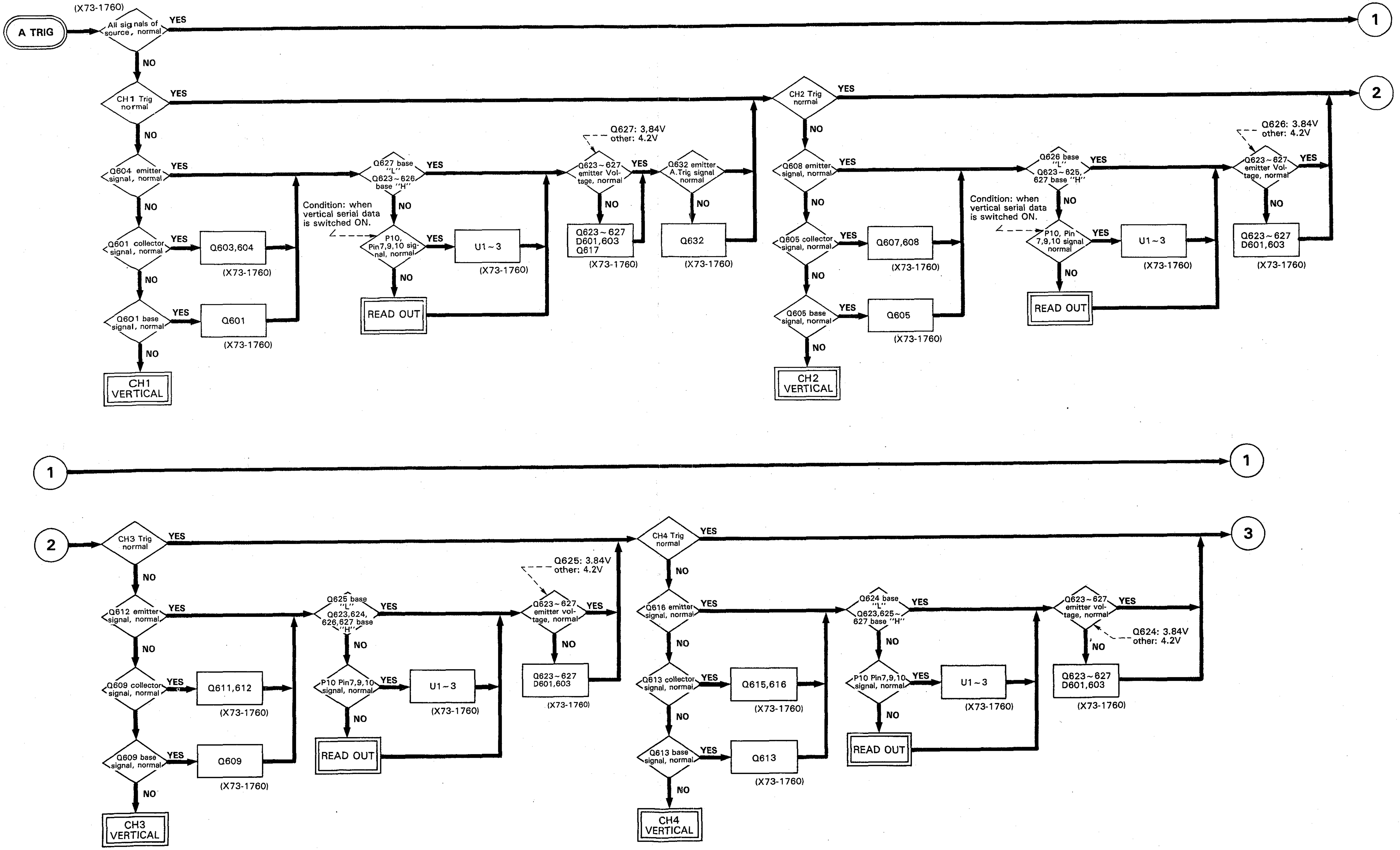
Table 28 MIX AMP CONTROL SIGNAL

HORIZONTAL DISPLAY	U19 Pin 11	U19 Pin 10	U19 Pin 9 (at MAG)
A	L	H	H (L)
A INT B	L	H	H
ALT	Toggle	H	H (Toggle)
B	H	H	H (L)
X-Y	L	L	H

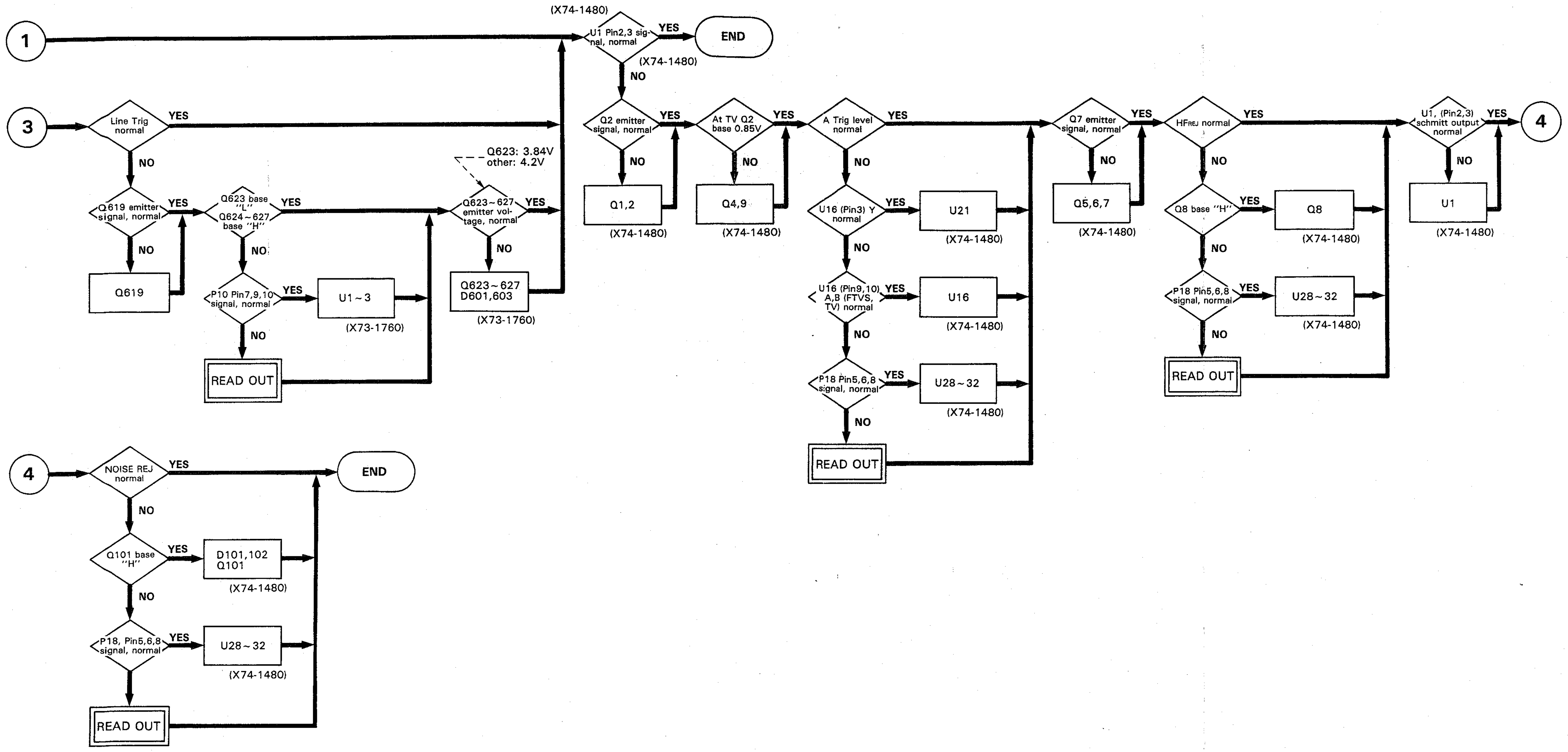
TROUBLESHOOTING


TRIG
U1 Pin 2 or 3 waveform normal
YES
NO
A TRIG
U2 Pin 2 or 3 waveform normal
YES
NO
B TRIG
END

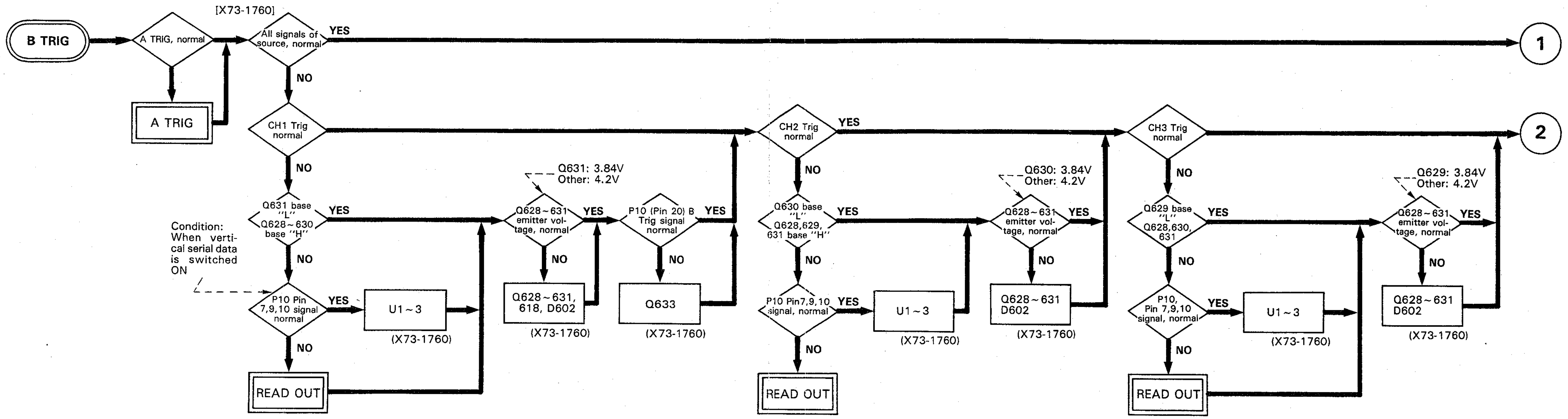
TROUBLESHOOTING

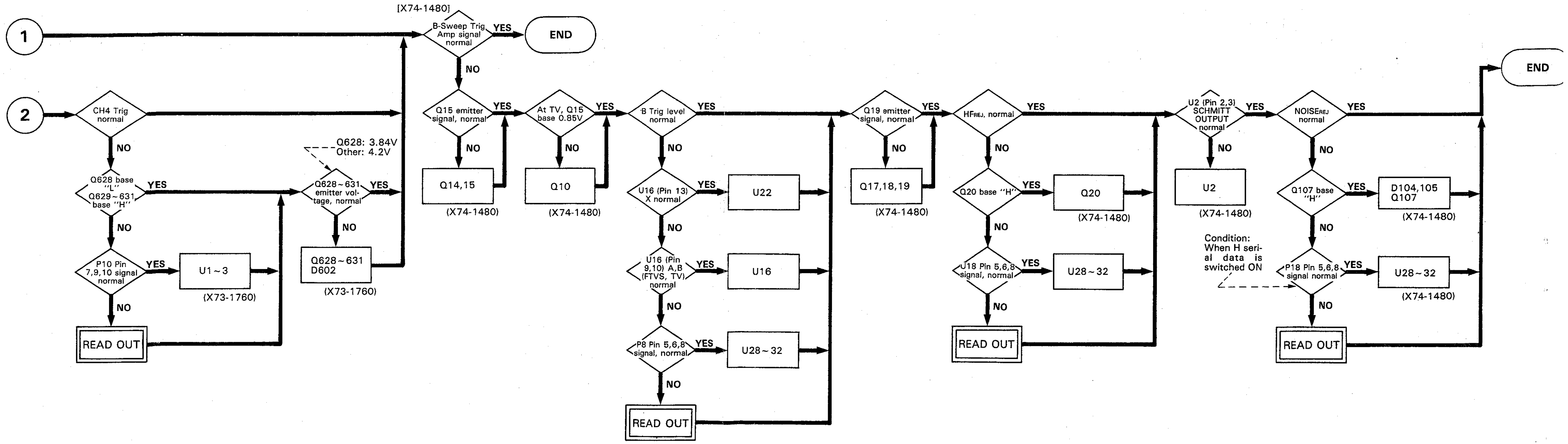

A TRIG
(X73-1760)
All signals of source, normal
YES
NO
1
CH1 Trig normal
YES
NO
2
Q604 emitter signal, normal
Q601 collector signal, normal
Q603,604
(X73-1760)
Q601 base signal, normal
Q601
(X73-1760)
CH1 VERTICAL
Q627 base "L" Q623~626 base "H"
Condition: when vertical serial data is switched ON.
P10, Pin7,9,10 signal, normal
U1~3
(X73-1760)
READ OUT
Q627: 3,84V
other: 4.2V
Q623~627 emitter Voltage, normal
Q623~627 D601,603 Q617
(X73-1760)
Q632 emitter A.Trig signal normal
Q632
(X73-1760)
CH2 Trig normal
Q608 emitter signal, normal
Q605 collector signal, normal
Q607,608
(X73-1760)
Q605 base signal, normal
Q605
(X73-1760)
CH2 VERTICAL
Q626 base "L" Q623~625, 627 base "H"
Condition: when vertical serial data is switched ON.
P10, Pin 7,9,10 signal normal
U1~3
(X73-1760)
READ OUT
Q626: 3.84V
other: 4.2V
Q623~627 emitter Voltage, normal
Q623~627 D601,603
(X73-1760)
1
2
CH3 Trig normal
3
Q612 emitter signal, normal
Q609 collector signal, normal
Q611,612
(X73-1760)
Q609 base signal, normal
Q609
(X73-1760)
CH3 VERTICAL
Q625 base "L" Q623,624, 626,627 base "H"
P10 Pin7,9,10 signal, normal
U1~3
(X73-1760)
READ OUT
Q625: 3.84V
other: 4.2V
Q623~627 emitter voltage, normal
Q623~627 D601,603
(X73-1760)
CH4 Trig normal
Q616 emitter signal, normal
Q613 collector signal, normal
Q615,616
(X73-1760)
Q613 base signal, normal
Q613
(X73-1760)
CH4 VERTICAL
Q624 base "L" Q623,625~627 base "H"
P10 Pin7,9,10 signal, normal
U1~3
(X73-1760)
READ OUT
Q623~627 emitter voltage, normal
Q624: 3.84V
other: 4.2V
Q623~627 D601,603
(X73-1760)

TROUBLESHOOTING


1
(X74-1480)
U1 Pin2,3 signal, normal
YES
END
(X74-1480)
NO
3
Line Trig normal
YES
NO
Q619 emitter signal, normal
YES
NO
Q619
Q623 base "L" Q624～627 base "H"
YES
NO
P10 Pin7,9,10 signal, normal
YES
U1～3
(X73-1760)
NO
READ OUT
Q623: 3.84V
other: 4.2V
Q623～627 emitter voltage, normal
YES
NO
Q623～627
D601,603
(X73-1760)
Q2 emitter signal, normal
YES
NO
Q1,2
(X74-1480)
At TV Q2 base 0.85V
YES
NO
Q4,9
(X74-1480)
A Trig level normal
YES
NO
U16 (Pin3) Y normal
YES
U21
(X74-1480)
NO
U16 (Pin9,10) A,B (FTVS, TV) normal
YES
U16
(X74-1480)
NO
P18 Pin5,6,8 signal, normal
YES
U28～32
(X74-1480)
NO
READ OUT
Q7 emitter signal, normal
YES
NO
Q5,6,7
(X74-1480)
HFREJ normal
YES
NO
Q8 base "H"
YES
Q8
(X74-1480)
NO
P18 Pin5,6,8 signal, normal
YES
U28～32
(X74-1480)
NO
READ OUT
U1, (Pin2,3) schmitt output normal
YES
4
NO
U1
(X74-1480)
4
NOISE REJ normal
YES
END
NO
Q101 base "H"
YES
D101,102
Q101
(X74-1480)
NO
P18, Pin5,6,8 signal, normal
YES
U28～32
(X74-1480)
READ OUT

TROUBLESHOOTING


B TRIG
A TRIG, normal
A TRIG
[X73-1760]
All signals of source, normal
YES
NO
1
CH1 Trig normal
CH2 Trig normal
CH3 Trig normal
2
Q631 base "L" Q628~630 base "H"
Condition: When vertical serial data is switched ON
P10 Pin 7,9,10 signal normal
U1~3
(X73-1760)
READ OUT
Q631: 3.84V Other: 4.2V
Q628~631 emitter voltage, normal
Q628~631, 618, D602
(X73-1760)
P10 (Pin 20) B Trig signal normal
Q633
(X73-1760)
Q630 base "L" Q628,629, 631 base "H"
P10 Pin7,9,10 signal, normal
U1~3
(X73-1760)
READ OUT
Q630: 3.84V Other: 4.2V
Q628~631 emitter voltage, normal
Q628~631 D602
(X73-1760)
Q629 base "L" Q628,630, 631
P10, Pin 7,9,10 signal, normal
U1~3
(X73-1760)
READ OUT
Q629: 3.84V Other: 4.2V
Q628~631 emitter voltage, normal
Q628~631 D602
(X73-1760)


1
2
[X74-1480]
B-Sweep Trig Amp signal normal
YES
NO
END
CH4 Trig normal
Q628 base "L" Q629~631 base "H"
P10 Pin 7,9,10 signal normal
U1~3
(X73-1760)
READ OUT
Q628: 3.84V Other: 4.2V
Q628~631 emitter voltage, normal
Q628~631 D602
(X73-1760)
Q15 emitter signal, normal
Q14,15
(X74-1480)
At TV, Q15 base 0.85V
Q10
(X74-1480)
B Trig level normal
U16 (Pin 13) X normal
U22
U16 (Pin 9,10) A,B (FTVS, TV) normal
U16
P8 Pin 5,6,8 signal, normal
U28~32
READ OUT
Q19 emitter signal, normal
Q17,18,19
(X74-1480)
HFREJ, normal
Q20 base "H"
Q20
(X74-1480)
U18 Pin 5,6,8 signal, normal
U28~32
READ OUT
U2 (Pin 2,3) SCHMITT OUTPUT normal
U2
(X74-1480)
Condition: When H serial data is switched ON
NOISEREJ normal
Q107 base "H"
D104,105 Q107
(X74-1480)
P18 Pin 5,6,8 signal normal
U28~32
(X74-1480)
READ OUT
END

TROUBLESHOOTING

ATT Unit Serial Data Active Level

ATT Code (CH1 and CH2)

	1/2* U3 Pin6 (U3 Pin3)	1/4* U3 Pin5 (U3 Pin2)	1/10 U1 Pin6 (U1 Pin2)	1/100 U1 Pin7 (U1 Pin3)	MAG* U3 Pin7 (U3 Pin4)	CH1 (CH2) Display
1 mV	L	L	L	L	L	1 mV
2 mV	H	L	L	L	L	2 mV
5 mV	L	L	L	L	H	5 mV
10 mV	H	L	L	L	H	10 mV
20 mV	L	H	L	L	H	20 mV
50 mV	L	L	H	L	H	50 mV
0.1 V	H	L	H	L	H	0.1 V
0.2 V	L	H	H	L	H	0.2 V
0.5 V	L	L	L	H	H	0.5 V
1 V	H	L	L	H	H	1 V
2 V	L	H	L	H	H	2 V
5 V	L	L	H	H	H	5 V

( ) CH2
*1/2, 1/4, MAG Signal Vertical Unit IC.

ATT Code (CH3 and CH4)

	CH3 U2 Pin1	CH4 U2 Pin2	Display
0.1V	H	H	0.1
0.5V	L	L	0.5

CH1,CH2 Coupling	Active	Output IC	Display
CH1 AC	L	U1 Pin4	mV or Ṽ
CH1 GND	L	U1 Pin5	⏚
CH2 AC	L	U1 Pin15	mV or Ṽ
CH2 GND	L	U1 Pin1	⏚

CH2 Polarity	U2 Pin3	Display
Normal	H	space
Invert	L	

Vertical Unit Serial Data Active Level

A-Source	Active	Output IC
CH1	L	U2 Pin 4
CH2	L	U2 Pin 3
CH3	L	U2 Pin 2
CH4	L	U2 Pin 1
LINE	L	U2 Pin 15

B-Source	Active	Output IC
CH1	L	U1 Pin 2
CH2	L	U1 Pin 1
CH3	L	U1 Pin 15
CH4	L	U2 Pin 5

V-Mode	Active	Output IC
CH1E	L	U1 Pin 7
CH2E	L	U1 Pin 6
CH3E	L	U1 Pin 5
CH4E	L	U1 Pin 4
ADDE	L	U1 Pin 3

20MHz BWL	Active	Output IC	Display
BW	L	U3 Pin 1	Bw

Horizontal Unit Serial Data Active Level

(A-Coupling)	Active	Output IC	Condition
AC	L	U29 Pin 7	A Coupling"AC" or A-Source "LINE"
NOISE$_{REJ}$	H	U29 Pin 5	A-Coupling "NOISE$_{REJ}$"
HF$_{REJ}$	H	U29 Pin 6	A-Coupling "HF$_{REJ}$" or "TV-V" or A-Source "LINE"
TV	H	U29 Pin 4	A-Coupling "TV-V" or "TV-H"
(B-Coupling)			
AC	L	U29 Pin 15	B-Coupling "AC"
NOISE$_{REJ}$	H	U29 Pin 2	B-Coupling "NOISE$_{REJ}$"
HF$_{REJ}$	H	U29 Pin 1	B-Coupling "HF$_{REJ}$"
FTVS	H	U29 Pin 3	A-Coupling "TV-V" "TV-H" and Slope "−" or "FIX"

ASLOPE	U30 Pin 7
+	H
−	L

B SLOPE	U30 Pin 6
+	H
−	L

SWEEP MODE	U30 Pin 5	Condition
NORMAL	L	Non "AUTO" or "X-Y"

HORIZONTAL MODE	Active	Output IC	Condition	Display
A	L	U32 Pin 6	Horizontal Mode "A"	A Sweep Time
ALT	L	U32 Pin 1	Horizontal Mode "ALT"	A, B Sweep Time
B	L	U32 Pin 3	Horizontal Mode "B"	A, B Sweep Time
X, Y	L	U28 Pin 7	Horizontal Mode "X, Y"	"CH2-X"
X-Y SGL	H	U32 Pin 4	Horizontal Mode "X-Y" and single sweep	

MAG	U32 Pin 2	Condition
normal	H	Horizontal Mode "A INT B" or "X-Y" or MAG normal
X10 MAG	L	

Single Sweep	Active	Output IC
Single	L	U30 Pin 2

CHOP	Active	Output IC
CHOP	L	U30 Pin 15

B (TV)	A (FTVS)	Y	X
0	0	Y0 (ALVL)	Y0 (BLVL)
0	1	Y1 (FIX)	X1 (BLVL) (X0=X1)
1	0	Y2 (TV+)	X2 (TV+)
1	1	Y3 (TV−)	X3 (TV−)

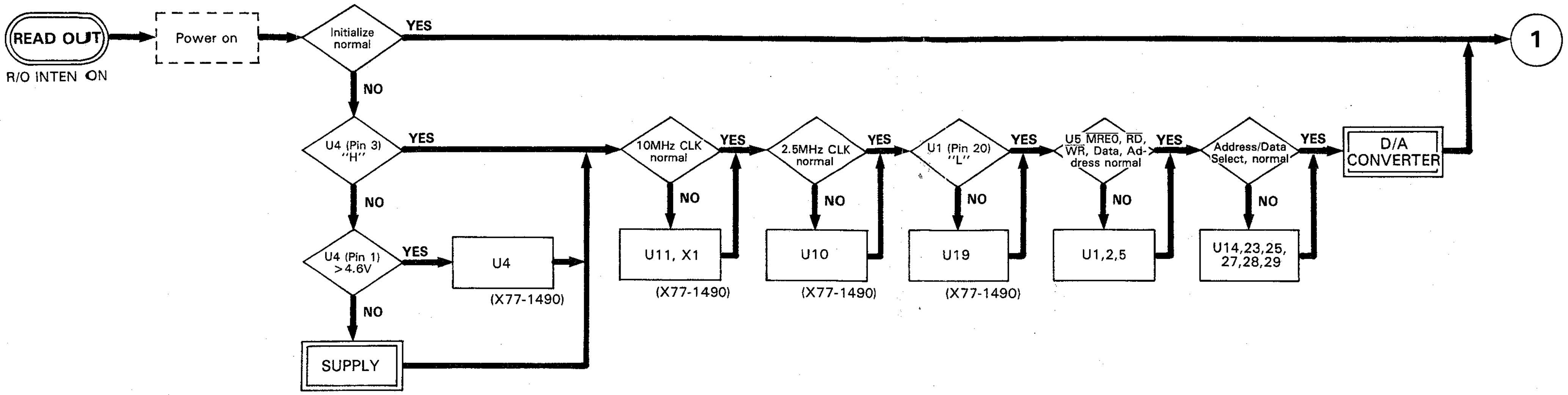
X74-1480
U16 Analog SW Control signal

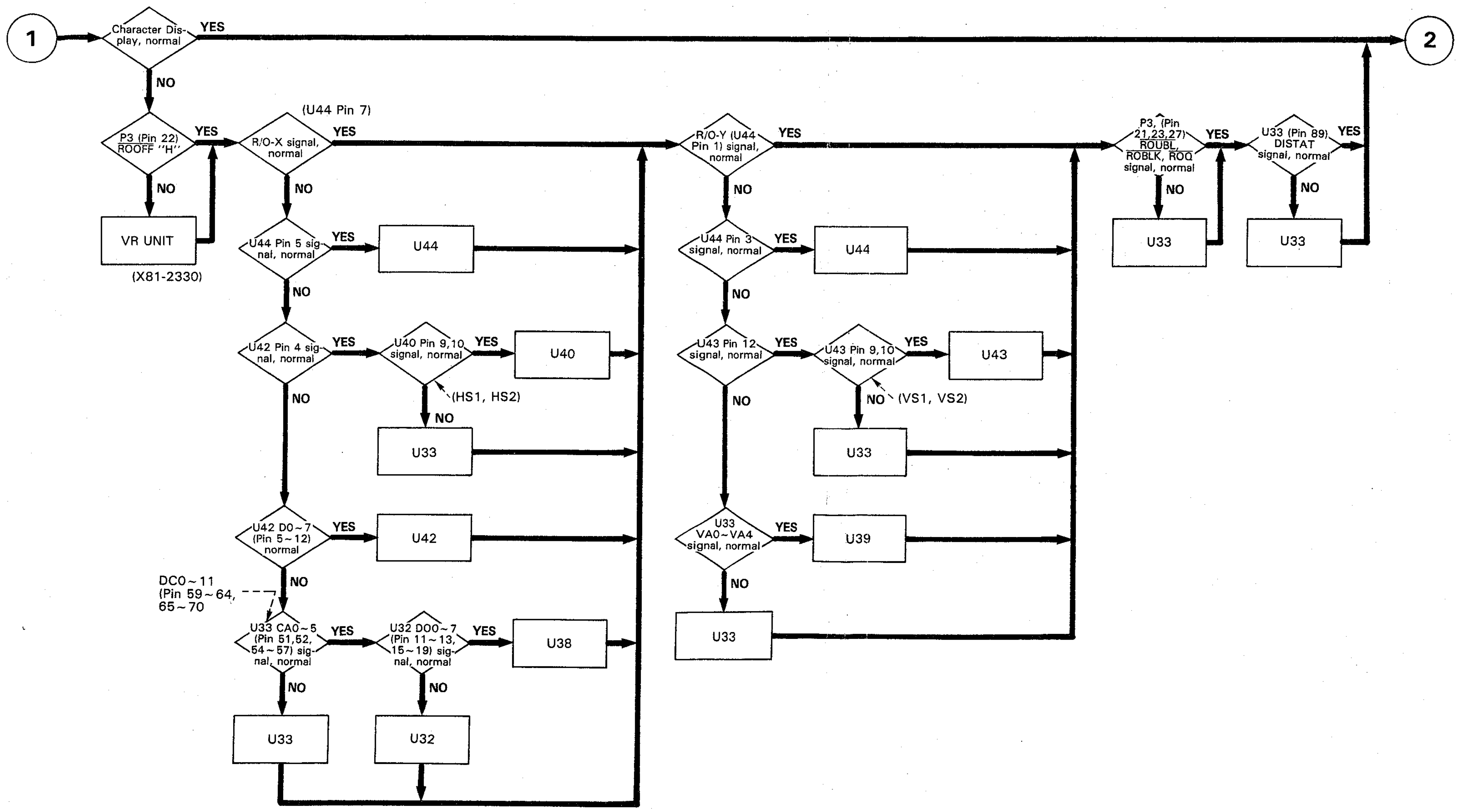
TV...TV-V or TV-H "H" other "L"
FTVS...Fix or TV SLOPE ⊖ "H" other "L"

SWEEP TIME CODE

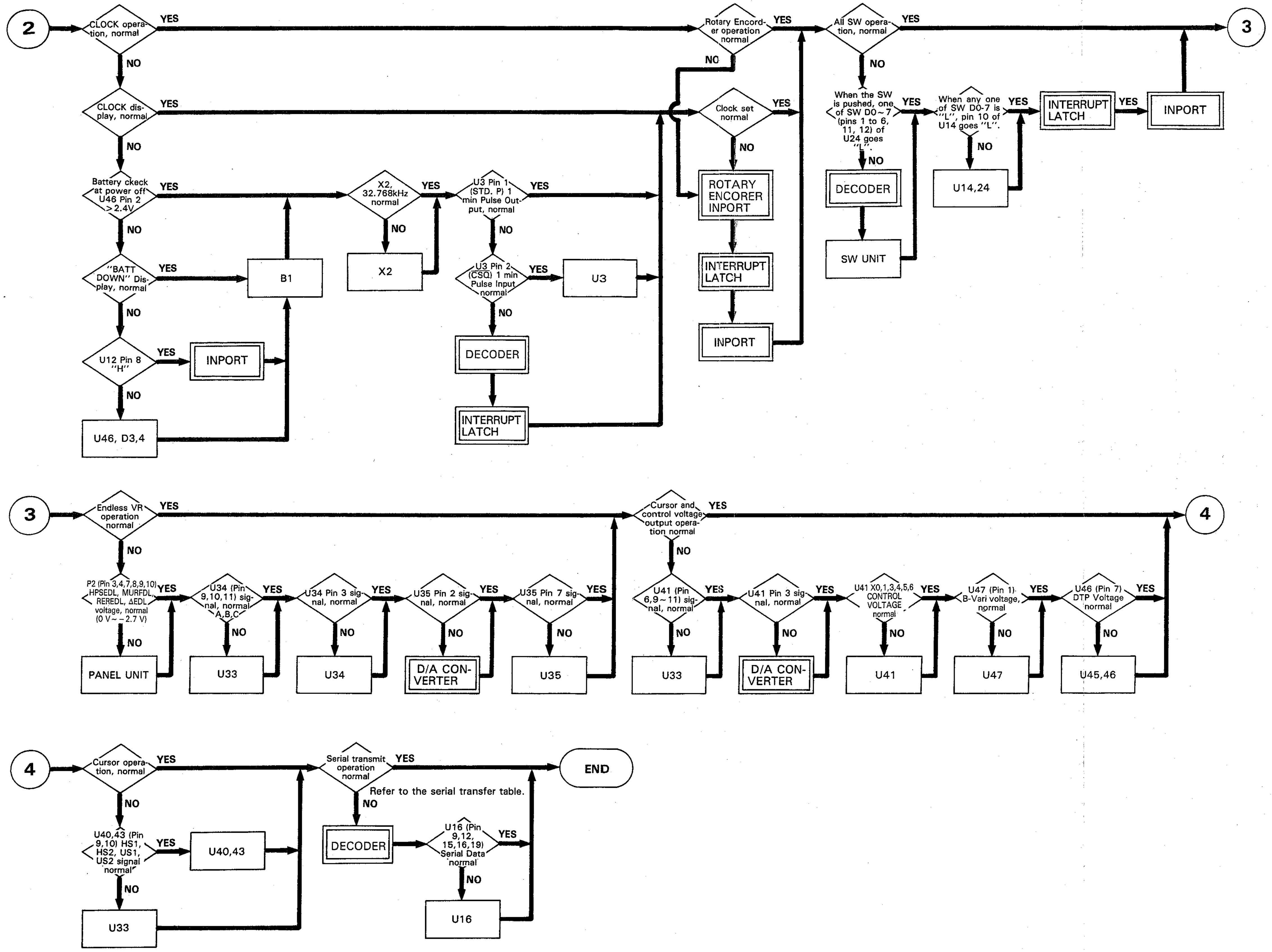
	A Sweep Time Code			B Sweep Time Code		
Sweep Time	AS-A	AS-B	AS-C	BS-A	BS-B	BS-C
0.5s	0	0	0			
0.2s	0	0	0			
0.1s	0	0	0			
50ms	1	0	0	1	0	0
20ms	1	0	0	1	0	0
10ms	1	0	0	1	0	0
5ms	0	1	0	0	1	0
2ms	0	1	0	0	1	0
1ms	0	1	0	0	1	0
0.5ms	1	1	0	1	1	0
0.2ms	1	1	0	1	1	0
0.1ms	1	1	0	1	1	0
50μs	0	0	1	0	0	1
20μs	0	0	1	0	0	1
10μs	0	0	1	0	0	1
5μs	1	0	1	1	0	1
2μs	1	0	1	1	0	1
1μs	1	0	1	1	0	1
0.5μs	0	1	1	0	1	1
0.2μs	0	1	1	0	1	1
0.1μs	0	1	1	0	1	1
50ns	1	1	1	1	1	1
20ns	1	1	1	1	1	1

TROUBLESHOOTING

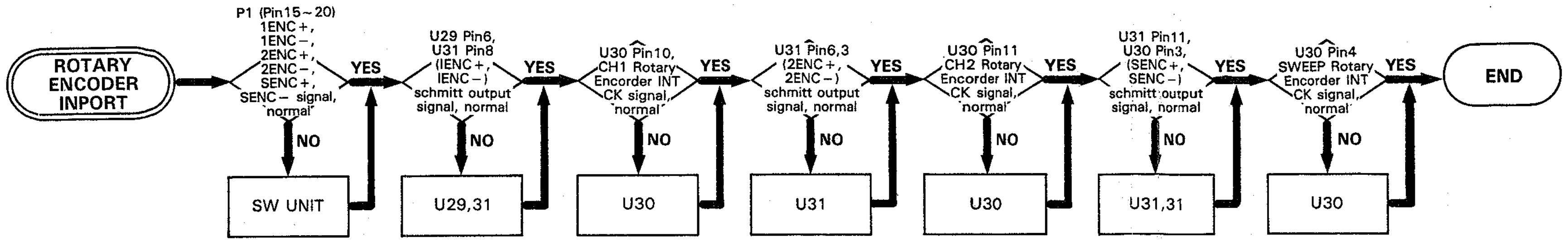

READ OUT
R/O INTEN ON
Power on
Initialize normal
YES
NO
1
U4 (Pin 3) "H"
YES
NO
10MHz CLK normal
YES
NO
2.5MHz CLK normal
YES
NO
U1 (Pin 20) "L"
YES
NO
U5 MREQ, RD, WR, Data, Address normal
YES
NO
Address/Data Select, normal
YES
NO
D/A CONVERTER
U4 (Pin 1) >4.6V
YES
NO
U4
(X77-1490)
U11, X1
(X77-1490)
U10
(X77-1490)
U19
(X77-1490)
U1,2,5
U14,23,25, 27,28,29
SUPPLY

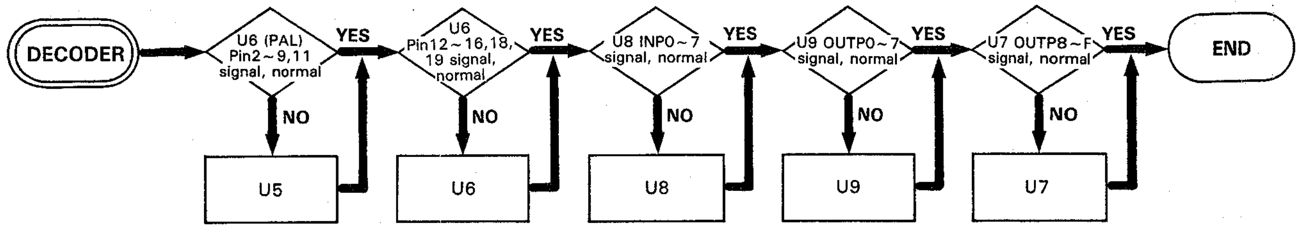

1
Character Display, normal
YES
NO
2
P3 (Pin 22) ROOFF "H"
YES
NO
VR UNIT
(X81-2330)
(U44 Pin 7)
R/O-X signal, normal
YES
NO
U44 Pin 5 signal, normal
YES
NO
U44
U42 Pin 4 signal, normal
YES
NO
U40 Pin 9,10 signal, normal
YES
NO
(HS1, HS2)
U40
U33
U42 D0~7 (Pin 5~12) normal
YES
NO
U42
DC0~11 (Pin 59~64, 65~70
U33 CA0~5 (Pin 51,52, 54~57) signal, normal
YES
NO
U32 D00~7 (Pin 11~13, 15~19) signal, normal
YES
NO
U38
U33
U32
R/O-Y (U44 Pin 1) signal, normal
YES
NO
U44 Pin 3 signal, normal
YES
NO
U44
U43 Pin 12 signal, normal
YES
NO
U43 Pin 9,10 signal, normal
YES
NO
(VS1, VS2)
U43
U33
U33 VA0~VA4 signal, normal
YES
NO
U39
U33
P3, (Pin 21,23,27) ROUBL, ROBLK, ROQ signal, normal
YES
NO
U33
U33 (Pin 89) DISTAT signal, normal
YES
NO
U33

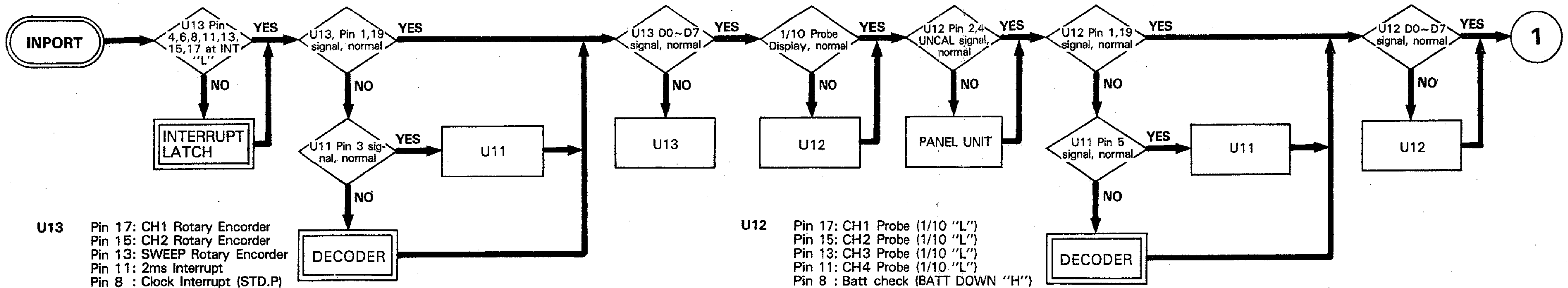
TROUBLESHOOTING


2
CLOCK operation, normal
YES
NO
CLOCK display, normal
Battery ckeck at power off U46 Pin 2 > 2.4V
"BATT DOWN" Display, normal
U12 Pin 8 "H"
INPORT
U46, D3,4
B1
X2, 32.768kHz normal
X2
U3 Pin 1 (STD. P) 1 min Pulse Output, normal
U3 Pin 2 (CSQ) 1 min Pulse Input normal
U3
DECODER
INTERRUPT LATCH
Rotary Encorder operation normal
Clock set normal
ROTARY ENCORER INPORT
INTERRUPT LATCH
INPORT
All SW operation, normal
When the SW is pushed, one of SW D0~7 (pins 1 to 6, 11, 12) of U24 goes "L".
DECODER
SW UNIT
When any one of SW D0-7 is "L", pin 10 of U14 goes "L".
U14,24
INTERRUPT LATCH
INPORT
3
3
Endless VR operation normal
P2 (Pin 3,4,7,8,9,10) HPSEDL, MURFDL, REREDL, ΔEDL voltage, normal (0 V~−2.7 V)
PANEL UNIT
U34 (Pin 9,10,11) signal, normal A,B,C
U33
U34 Pin 3 signal, normal
U34
U35 Pin 2 signal, normal
D/A CONVERTER
U35 Pin 7 signal, normal
U35
Cursor and control voltage output operation normal
U41 (Pin 6,9~11) signal, normal
U33
U41 Pin 3 signal, normal
D/A CONVERTER
U41 X0,1,3,4,5,6 CONTROL VOLTAGE normal
U41
U47 (Pin 1) B-Vari voltage, normal
U47
U46 (Pin 7) DTP Voltage normal
U45,46
4
4
Cursor operation, normal
U40,43 (Pin 9,10) HS1, HS2, US1, US2 signal normal
U40,43
U33
Serial transmit operation normal
Refer to the serial transfer table.
DECODER
U16 (Pin 9,12, 15,16,19) Serial Data normal
U16
END

TROUBLESHOOTING


ROTARY ENCODER INPORT
P1 (Pin15~20) 1ENC+, 1ENC−, 2ENC+, 2ENC−, SENC+, SENC− signal, 'normal'
NO
SW UNIT
YES
U29 Pin6, U31 Pin8 (IENC+, IENC−) schmitt output signal, normal
NO
U29,31
YES
U30 Pin10, CH1 Rotary Encorder INT CK signal, 'normal'
NO
U30
YES
U31 Pin6,3 (2ENC+, 2ENC−) schmitt output signal, normal
NO
U31
YES
U30 Pin11 CH2 Rotary Encorder INT CK signal, 'normal'
NO
U30
YES
U31 Pin11, U30 Pin3, (SENC+, SENC−) schmitt output signal, normal
NO
U31,31
YES
U30 Pin4 SWEEP Rotary Encorder INT CK signal, 'normal'
NO
U30
YES
END

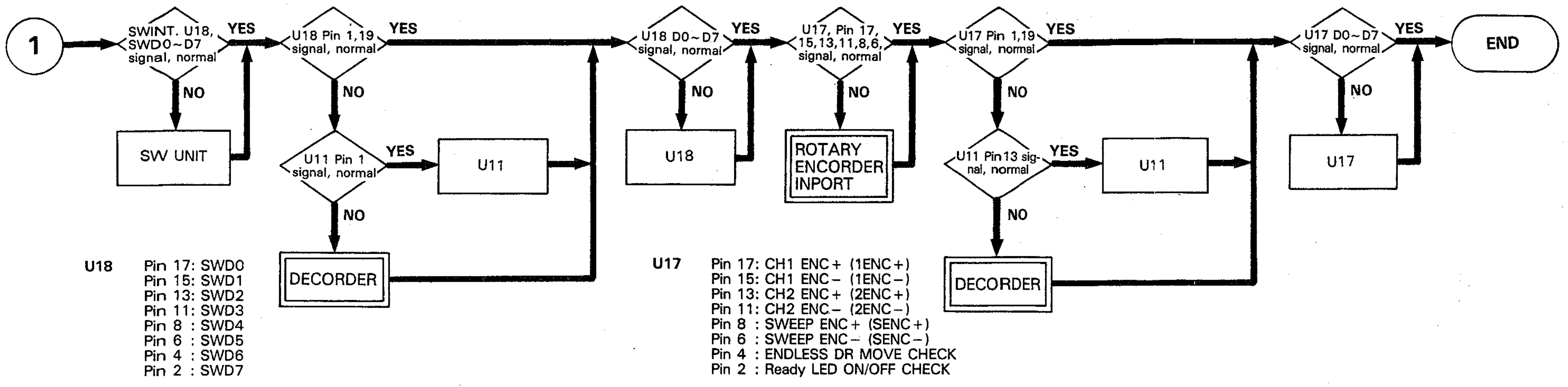

DECODER
U6 (PAL) Pin2~9,11 signal, normal
NO
U5
YES
U6 Pin12~16,18, 19 signal, normal
NO
U6
YES
U8 INP0~7 signal, normal
NO
U8
YES
U9 OUTP0~7 signal, normal
NO
U9
YES
U7 OUTP8~F signal, normal
NO
U7
YES
END


INPORT
U13 Pin 4,6,8,11,13, 15,17 at INT "L"
NO
INTERRUPT LATCH
YES
U13, Pin 1,19 signal, normal
NO
U11 Pin 3 signal, normal
YES
U11
NO
DECODER
YES
U13 D0~D7 signal, normal
NO
U13
YES
1/10 Probe Display, normal
NO
U12
YES
U12 Pin 2,4 UNCAL signal, normal
NO
PANEL UNIT
YES
U12 Pin 1,19 signal, normal
NO
U11 Pin 5 signal, normal
YES
U11
NO
DECODER
YES
U12 D0~D7 signal, normal
NO
U12
YES
1

U13
Pin 17: CH1 Rotary Encorder
Pin 15: CH2 Rotary Encorder
Pin 13: SWEEP Rotary Encorder
Pin 11: 2ms Interrupt
Pin 8 : Clock Interrupt (STD.P)
Pin 6 : SW Interrupt
Pin 4 : DISTAT
Pin 2 : "L" (always)

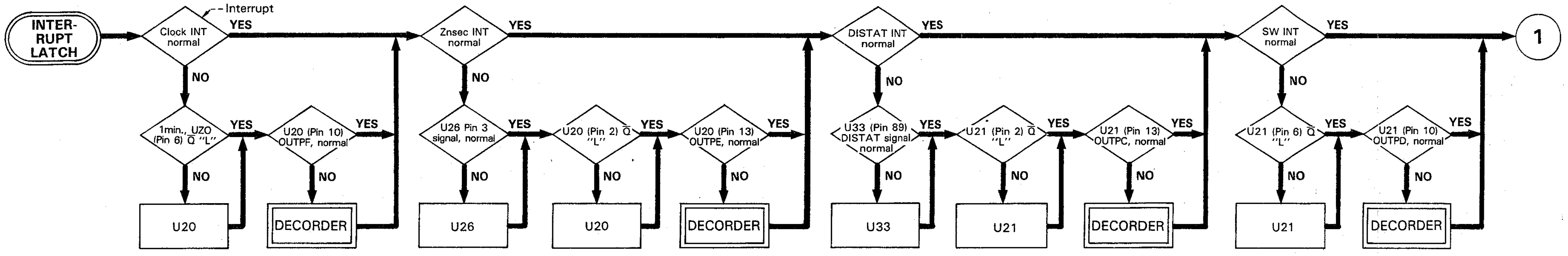
U12
Pin 17: CH1 Probe (1/10 "L")
Pin 15: CH2 Probe (1/10 "L")
Pin 13: CH3 Probe (1/10 "L")
Pin 11: CH4 Probe (1/10 "L")
Pin 8 : Batt check (BATT DOWN "H")
Pin 6 :
Pin 4 : CH1 UNCAL (UNCAL "H")
Pin 2 : CH2 UNCAL (UNCAL "H")

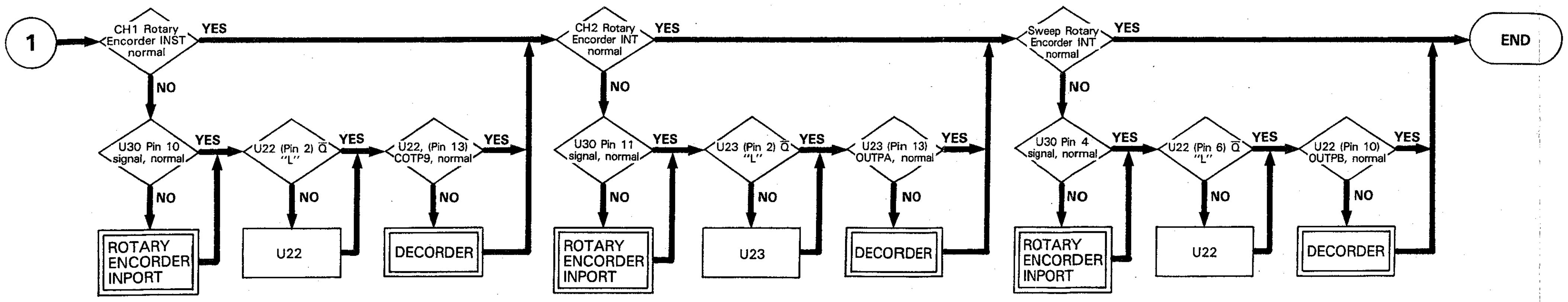
TROUBLESHOOTING


1
SWINT. U18, SWD0~D7 signal, normal
YES
NO
SW UNIT
U18 Pin 1,19 signal, normal
YES
NO
U11 Pin 1 signal, normal
YES
U11
NO
DECORDER
U18 D0~D7 signal, normal
YES
NO
U18
U17, Pin 17, 15,13,11,8,6, signal, normal
YES
NO
ROTARY ENCORDER INPORT
U17 Pin 1,19 signal, normal
YES
NO
U11 Pin13 signal, normal
YES
U11
NO
DECORDER
U17 D0~D7 signal, normal
YES
NO
U17
END

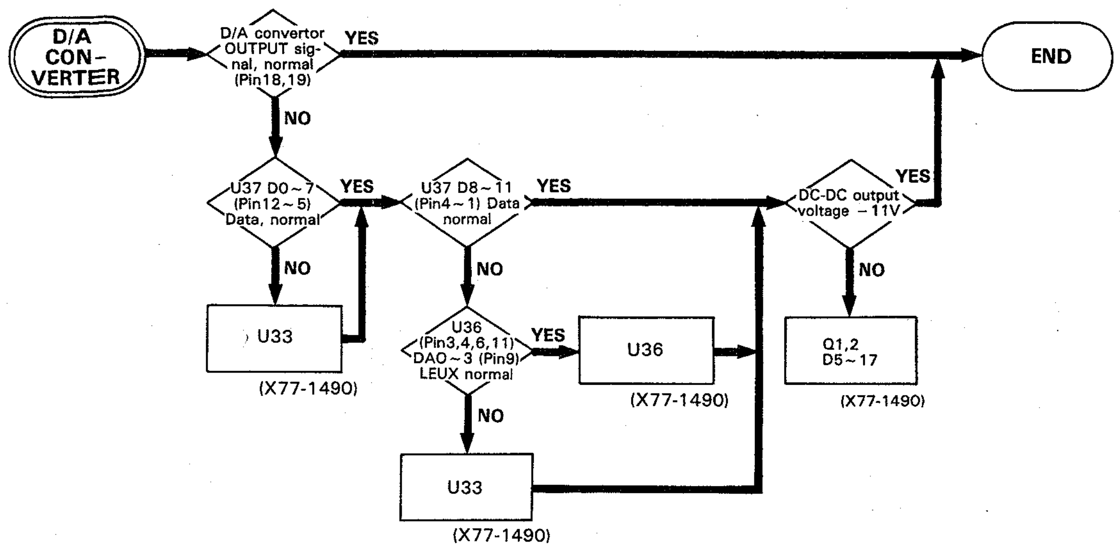
U18
Pin 17: SWD0
Pin 15: SWD1
Pin 13: SWD2
Pin 11: SWD3
Pin 8 : SWD4
Pin 6 : SWD5
Pin 4 : SWD6
Pin 2 : SWD7

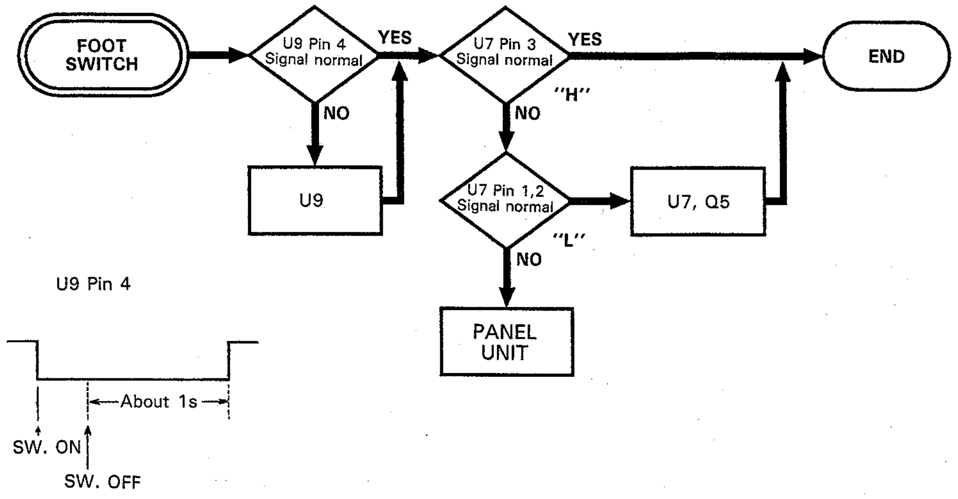
U17
Pin 17: CH1 ENC+ (1ENC+)
Pin 15: CH1 ENC− (1ENC−)
Pin 13: CH2 ENC+ (2ENC+)
Pin 11: CH2 ENC− (2ENC−)
Pin 8 : SWEEP ENC+ (SENC+)
Pin 6 : SWEEP ENC− (SENC−)
Pin 4 : ENDLESS DR MOVE CHECK
Pin 2 : Ready LED ON/OFF CHECK

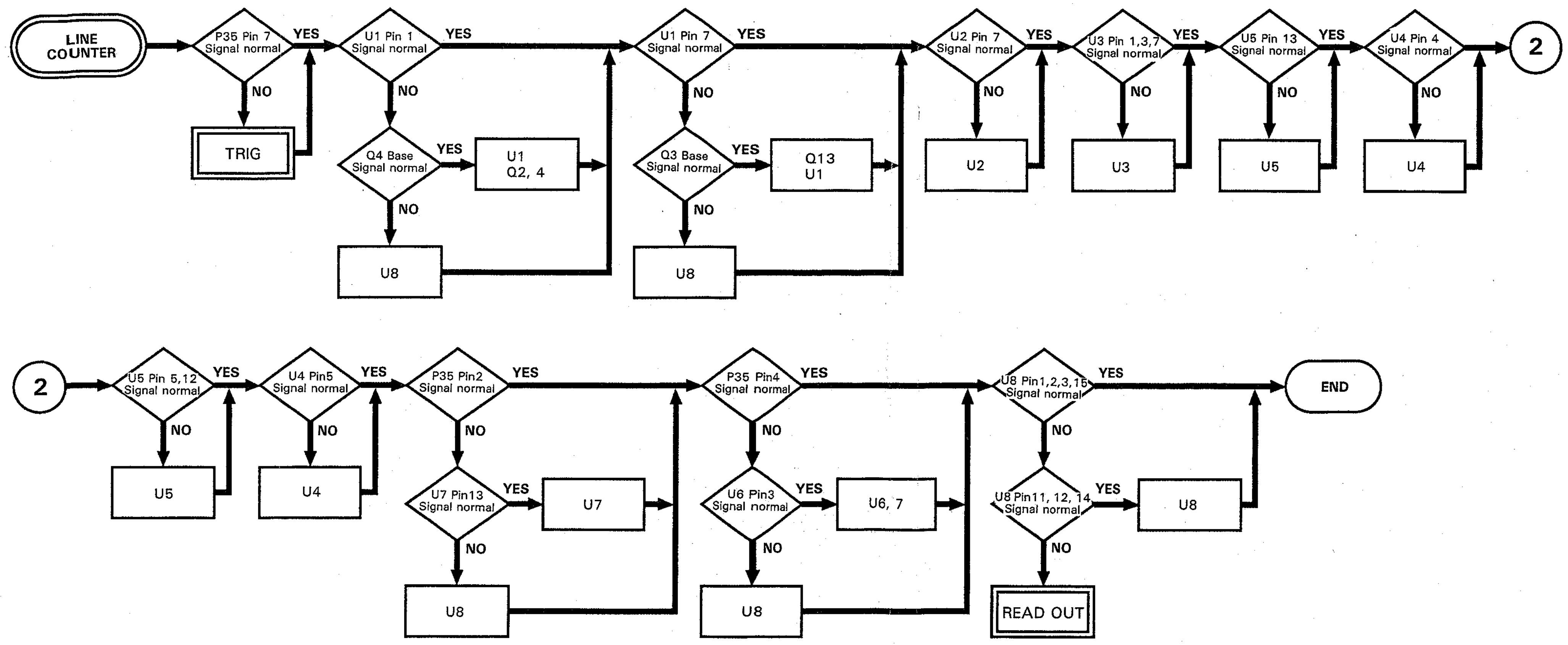

INTER-RUPT LATCH
Interrupt
Clock INT normal
YES
NO
1min., UZO (Pin 6) $\overline{Q}$ "L"
YES
NO
U20
U20 (Pin 10) OUTPF, normal
YES
NO
DECORDER
Znsec INT normal
YES
NO
U26 Pin 3 signal, normal
YES
NO
U26
U20 (Pin 2) $\overline{Q}$ "L"
YES
NO
U20
U20 (Pin 13) OUTPE, normal
YES
NO
DECORDER
DISTAT INT normal
YES
NO
U33 (Pin 89) DISTAT signal normal
YES
NO
U33
U21 (Pin 2) $\overline{Q}$ "L"
YES
NO
U21
U21 (Pin 13) OUTPC, normal
YES
NO
DECORDER
SW INT normal
YES
NO
U21 (Pin 6) $\overline{Q}$ "L"
YES
NO
U21
U21 (Pin 10) OUTPD, normal
YES
NO
DECORDER
1


1
CH1 Rotary Encorder INST normal
YES
NO
U30 Pin 10 signal, normal
YES
NO
ROTARY ENCORDER INPORT
U22 (Pin 2) $\overline{Q}$ "L"
YES
NO
U22
U22, (Pin 13) COTP9, normal
YES
NO
DECORDER
CH2 Rotary Encorder INT normal
YES
NO
U30 Pin 11 signal, normal
YES
NO
ROTARY ENCORDER INPORT
U23 (Pin 2) $\overline{Q}$ "L"
YES
NO
U23
U23 (Pin 13) OUTPA, normal
YES
NO
DECORDER
Sweep Rotary Encorder INT normal
YES
NO
U30 Pin 4 signal, normal
YES
NO
ROTARY ENCORDER INPORT
U22 (Pin 6) $\overline{Q}$ "L"
YES
NO
U22
U22 (Pin 10) OUTPB, normal
YES
NO
DECORDER
END

TROUBLESHOOTING

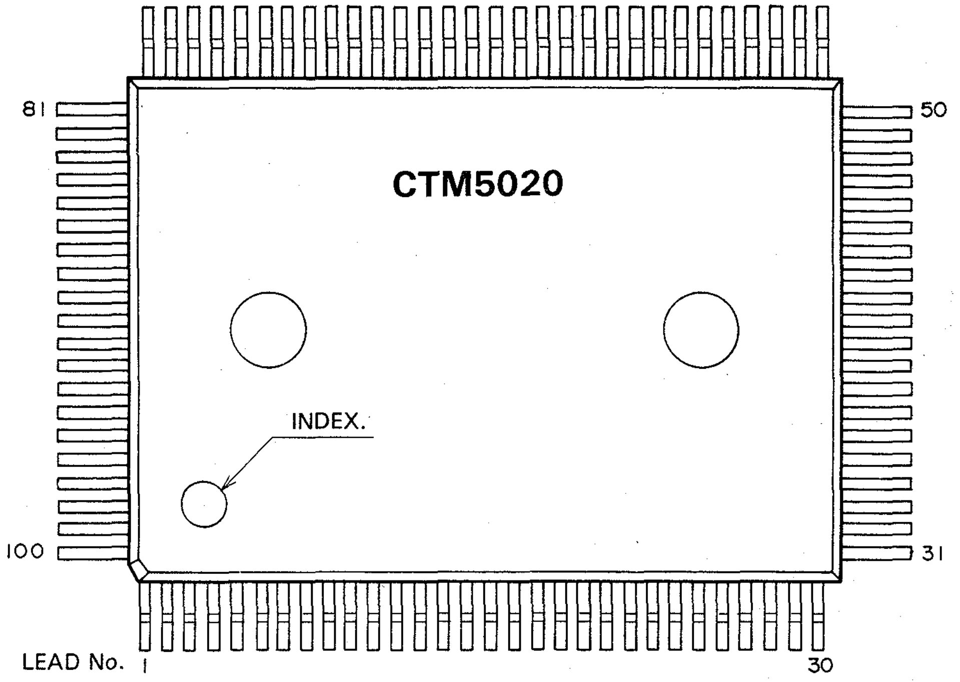

D/A CON-VERTER
D/A convertor OUTPUT signal, normal (Pin18,19)
YES
END
NO
U37 D0~7 (Pin12~5) Data, normal
YES
U37 D8~11 (Pin4~1) Data normal
YES
DC-DC output voltage −11V
YES
NO
U33
(X77-1490)
NO
U36 (Pin3,4,6,11) DAO~3 (Pin9) LEUX normal
YES
U36
(X77-1490)
NO
Q1,2 D5~17
(X77-1490)
NO
U33
(X77-1490)


FOOT SWITCH
U9 Pin 4 Signal normal
YES
U7 Pin 3 Signal normal
YES
END
"H"
NO
NO
U9
U7 Pin 1,2 Signal normal
U7, Q5
"L"
NO
PANEL UNIT
U9 Pin 4
About 1s
SW. ON
SW. OFF


LINE COUNTER
P35 Pin 7 Signal normal
YES
U1 Pin 1 Signal normal
YES
U1 Pin 7 Signal normal
YES
U2 Pin 7 Signal normal
YES
U3 Pin 1,3,7 Signal normal
YES
U5 Pin 13 Signal normal
YES
U4 Pin 4 Signal normal
2
NO
TRIG
NO
Q4 Base Signal normal
YES
U1 Q2, 4
NO
U8
NO
Q3 Base Signal normal
YES
Q13 U1
NO
U8
NO
U2
NO
U3
NO
U5
NO
U4
2
U5 Pin 5,12 Signal normal
YES
U4 Pin5 Signal normal
YES
P35 Pin2 Signal normal
YES
P35 Pin4 Signal normal
YES
U8 Pin1,2,3,15 Signal normal
YES
END
NO
U5
NO
U4
NO
U7 Pin13 Signal normal
YES
U7
NO
U8
NO
U6 Pin3 Signal normal
YES
U6, 7
NO
U8
NO
U8 Pin11, 12, 14 Signal normal
YES
U8
NO
READ OUT

TROUBLESHOOTING

CTM5020 PIN ASSIGNMENT (100-pin FPT) (with RAM)

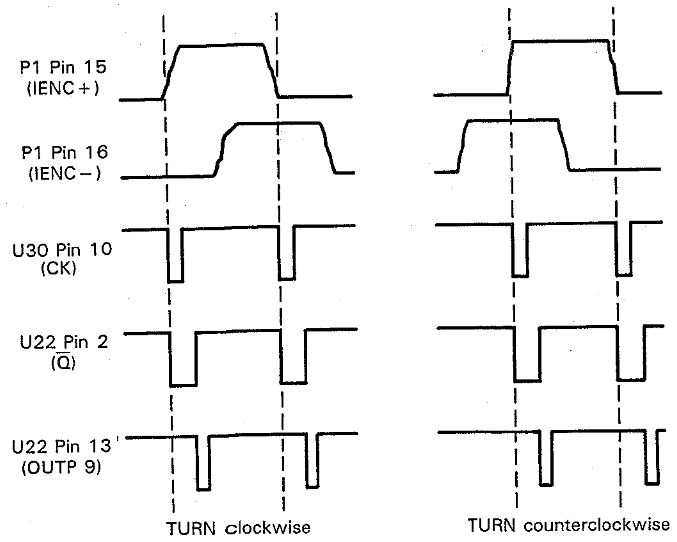


CTM5020 PIN DESCRIPTION

Pin No.	I/O	Pin Name	Function
1	I	CONT	Selection between X-Y mode and normal mode
2	I	A13	Address bus A13
3	–	VDD	+5 V power supply
4	I	A14	Address bus A14
5	I	A15	Address bus A15
6	O	INTO	1/2 period of ROSF signal (Open pin)
7	O	VX3	Selection signal of analog switch to input the endless VR voltage
8	O	VX2	Selection signal of analog switch to input the endless VR voltage
9	O	VX1	Selection signal of analog switch to input the endless VR voltage
10	O	VX0	Selection signal of analog switch to input the endless VR voltage
11	O	DA0	Outport (8004H) D0 D/A data (LSB or D8)
12	O	DA1	Outport (8004H) D1 D/A data (D1 or D9)
13	O	DA2	Outport (8004H) D2 D/A data (D2 or D10)
14	O	DA3	Outport (8004H) D3 D/A data (D3 or MSB)
15	–	VSS	GND
16	O	DA4	Outport (8004H) D4 D/A data (D4)
17	O	DA5	Outport (8004H) D5 D/A data (D5)
18	O	DA6	Outport (8004H) D6 D/A data (D6)
19	O	DA7	Outport (8004H) D7 D/A data (D7)
20	O	DA8	Outport (8005H) D0 (Open pin)
21	O	DA9	Outport (8005H) D1 (Serial blanking control signal)
22	O	ROR	Readout monitor terminal
23	I	ROA	Readout monitor terminal
24	O	LEVX	Outport (8005H) D7 D/A Data D8~MSB Latch signal
25	I	TCL	Test pin (UDD)
26	I	TSD0	Test pin (GND)
27	I	TSD1	Test pin (GND)
28	–	VDD	+5 V power supply
29	I	TSD2	Test pin (GND)
30	O	AX2	Selection signal of analog switch to output the cursor, H Variable, Delay Position, H Position voltage
31	O	AX1	Selection signal of analog switch to output the cursor H variable, Delay Position, H Position voltage
32	O	AX0	Selection signal of analog switch to output the cursor H variable, Delay Position, H position voltage
33	O	AX3	Selection signal of analog switch to output the cursor H variable, Delay Position, H Position voltage
34	O	HS2	Selection signal of analog switch for the readout X-axis signal
35	O	HS1	Selection signal of analog switch for the readout X-axis signal
36	O	TDIO	Test pin (VDD)
37	I	TWE	Test pin (VDD)
38	I	TCK1	Test pin (VDD)
39	I	TST1	Test pin (VDD)
40	–	VSS	GND
41	I	TST2	Test pin (VDD)
42	I	TADD	Test pin (VDD)
43	I	TCK2	Test pin (VDD)
44	O	VS2	Selection signal of analog switch for the readout Y-axis signal
45	O	VS1	Selection signal of analog switch for the readout Y-axis signal
46	O	VA0	Character Y-axis DAC data
47	O	VA4	Character Y-axis DAC data
48	O	VA3	Character Y-axis DAC data
49	O	VA2	Character Y-axis DAC data
50	O	VA1	Character Y-axis DAC data
51	O	GETD	Character X-axis data latch clock
52	O	CA0	Character counter data
53	–	VDD	+5 V power supply
54	O	CA4	Character counter data
55	O	CA3	Character counter data
56	O	CA2	Character counter data
57	O	CA1	Character counter data
58	O	CD3	Character ROM address
59	O	CD2	Character ROM address
60	O	CD4	Character ROM address
61	O	CD1	Character ROM address
62	O	CD5	Character ROM address
63	O	DC4	Dot counter data
64	O	CD7	Character ROM address
65	–	VSS	GND
66	O	DC3	Dot counter data
67	O	DC2	Dot counter data
68	O	CD6	Character ROM address
69	O	DC1	Dot counter data
70	O	DC0	Dot counter data
71	O	CD0	Character ROM address (Open pin)
72	I	D07	Character ROM Y-axis DAC data
73	I	D06	Character ROM Y-axis DAC data
74	I	D05	Character ROM Y-axis DAC data
75	I	D04	Character ROM Y-axis DAC data
76	I	D03	Character ROM Y-axis DAC data
77	I	SING	Terminal for SINGLE signal
78	–	VDD	+5 V power supply
79	I	R10M	10 MHz clock
80	I	10M	10 MHz clock
81	I	HLDF	Holdoff input
82	I	SGA	Sweep gate
83	I	ROSP	Readout off
84	I	ROD	Character counter reset
85	O	HLDL	Holdoff output
86	O	ROUB	Readout unblanking
87	O	ROB	Readout blanking
88	O	ROQ	Readout request
89	O	ROED	Readout end
90	–	VSS	GND
91	I	D7	Data bus D7
92	I	D5	Data bus D5
93	I	D3	Data bus D3
94	I	D1	Data bus D1
95	I	ALE	Address/Data latch
96	I	D6	Data bus D6
97	I	D4	Data bus D4
98	I	D2	Data bus D2
99	I	D0	Data bus D0
100	I	WR	Write timing signal

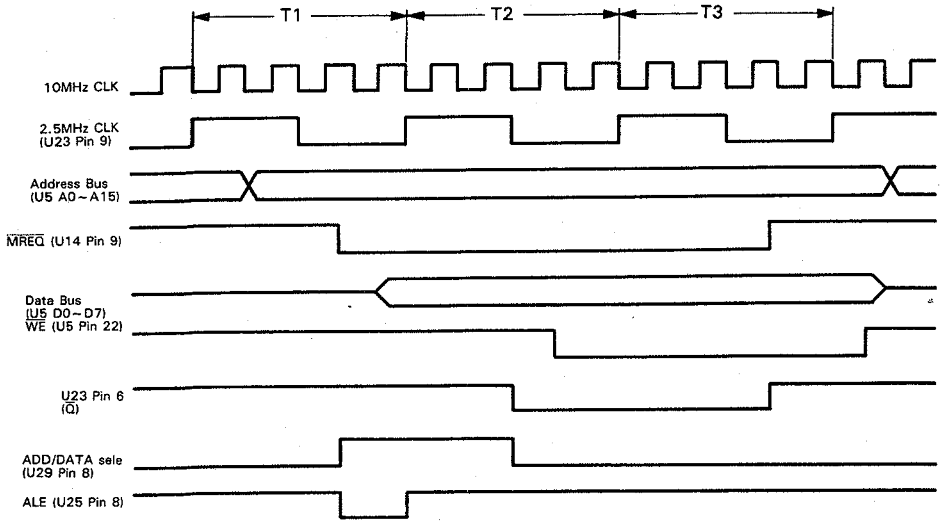
TROUBLESHOOTING

Rotary Encoder Timing chart (X77-1490-01),

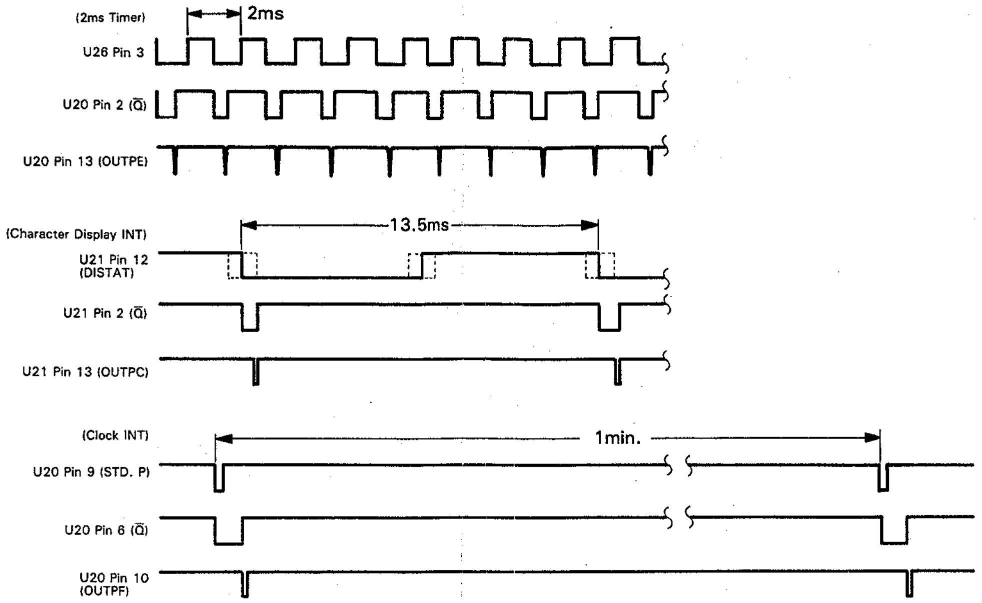

P1 Pin 15
(IENC+)
P1 Pin 16
(IENC−)
U30 Pin 10
(CK)
U22 Pin 2
$(\overline{Q})$
U22 Pin 13
(OUTP 9)
TURN clockwise
TURN counterclockwise

The timing charts of the CH2 rotary encoder and sweep rotary encoder are also the same.

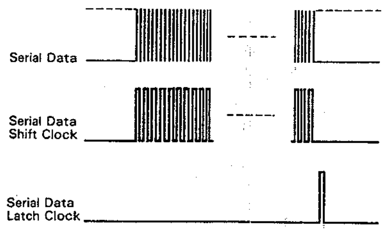
Address/Data Select Timing Chart (X77-1490-01)


T1
T2
T3
10MHz CLK
2.5MHz CLK
(U23 Pin 9)
Address Bus
(U5 A0~A15)
$\overline{MREQ}$ (U14 Pin 9)
Data Bus
(U5 D0~D7)
$\overline{WE}$ (U5 Pin 22)
U23 Pin 6
$(\overline{Q})$
ADD/DATA sele
(U29 Pin 8)
ALE (U25 Pin 8)

Interrupt Timing Chart


(2ms Timer)
2ms
U26 Pin 3
U20 Pin 2 $(\overline{Q})$
U20 Pin 13 (OUTPE)
(Character Display INT)
13.5ms
U21 Pin 12
(DISTAT)
U21 Pin 2 $(\overline{Q})$
U21 Pin 13 (OUTPC)
(Clock INT)
1min.
U20 Pin 9 (STD. P)
U20 Pin 6 $(\overline{Q})$
U20 Pin 10
(OUTPF)

Serial Transmit Timing Chart


Serial Data
Serial Data
Shift Clock
Serial Data
Latch Clock

	Panel SW SCAN	Panel LED Control	ATT UNIT Control	V UNIT Control	H UNIT Control
Serial Data	P1 Pin 4 (SD)	P1 Pin 1 (LD)	P4 Pin 9 (AD)	U16 Pin 16 (VD)	U16 Pin 19 (HD)
Serial Data shift Clock	P1 Pin 5 (SSC)	P1 Pin 2 (LSC)	P4 Pin 8 (ASC)	U9 Pin 14 (VSC)	U9 Pin 10 (HSC)
Serial Data Latch clock	P1 Pin 6 (SLC)	P1 Pin 3 (LLC)	P4 Pin 7 (ALC)	U8 Pin 11 (VLC)	U8 Pin 7 (HLC)

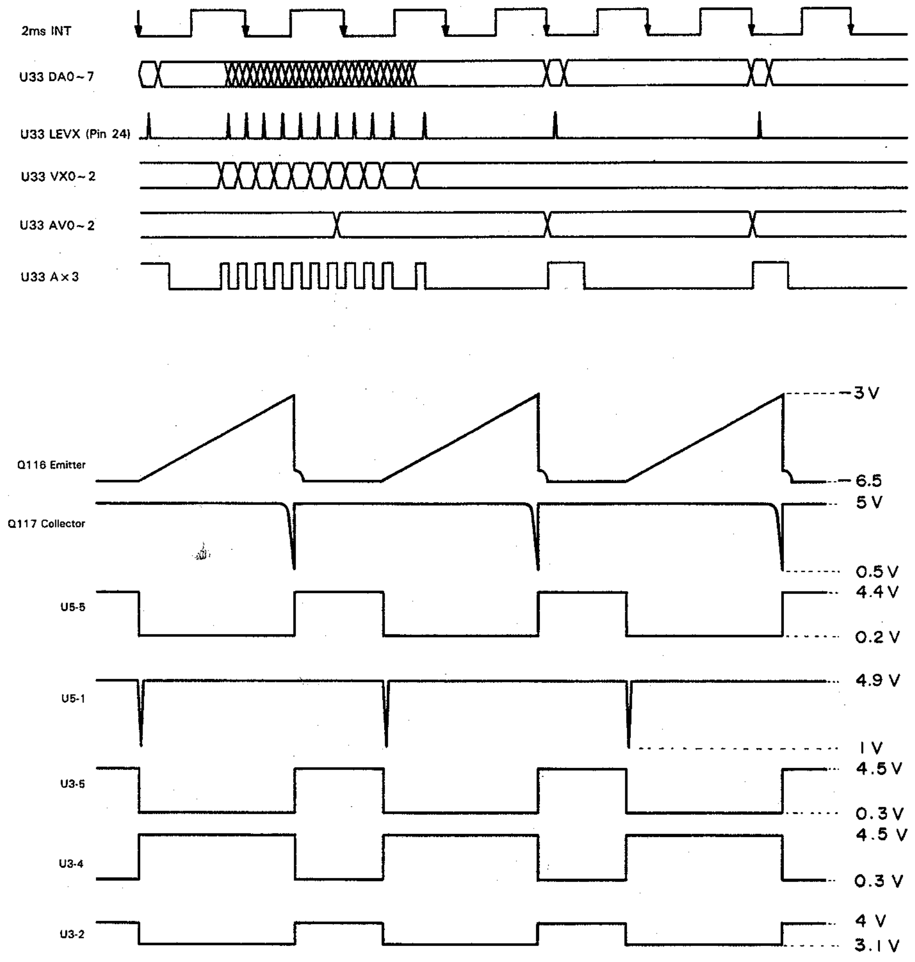
CH1 (CH2) Vertical Gain VARIABLE

V. Variable	U12 Pin 4 (2)	Display
CAL	L	Space
UNCAL	H	>

CH1 ~ CH4 Probe

Probe	U12 Pin 17,15,13,11	Display
1/1	H	Volts/div × 1 display
1/10	L	Volts/div × 10 display

Endless VR Select and Control Timing Chart


2ms INT
U33 DA0~7
U33 LEVX (Pin 24)
U33 VX0~2
U33 AV0~2
U33 A×3
Q116 Emitter
Q117 Collector
U5-5
U5-1
U3-5
U3-4
U3-2
3 V
6.5
5 V
0.5 V
4.4 V
0.2 V
4.9 V
1 V
4.5 V
0.3 V
4.5 V
0.3 V
4 V
3.1 V

Endless VR Select

V×2	V×1	V×0	Select CH	Endless VR
L	L	L	U34 Pin 13	Δ Endless VR
L	L	H	U34 Pin 14	
L	H	L	U34 Pin 15	REF Endless VR
L	H	H	U34 Pin 12	
H	L	L	U34 Pin 1	H-Posi Endless VR
H	L	H	U34 Pin 5	
H	H	L	U34 Pin 2	H-Vari Endless VR
H	H	H	U34 Pin 4	

CONTROL Voltage Select

A×3	A×2	A×1	A×0	Select CH	Control Voltage
L	L	L	L	U41 Pin13	REF Cursor
L	L	L	H	U41 Pin 14	Δ Cursor
L	L	H	L	U41 Pin 15	A-Variable
L	L	H	H	U41 Pin 12	B-Variable
L	H	L	L	U41 Pin 1	V-Delay (DTP)
L	H	L	H	U41 Pin 5	C-Delay (DTP)
L	H	H	L	U41 Pin 2	H-Posi
L	H	H	H	U41 Pin 4*	
H	X	X	X	All off	Inhibit

* Items marked * are not selected.
X Items marked X can be either L or H.

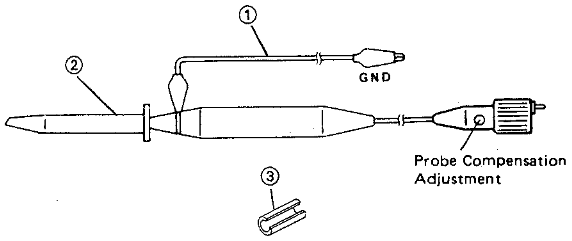
PARTS LIST

CS-6040 UNIT

Y70-1700-00

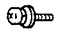
REF.NO	PARTS NO	NAME & DESCRIPTION
	A20-2828-52	PANEL ASS'Y
	B07-0703-04	ESCUTCHEON FOR ASTIG
	B30-0925-05	LAMP
	B41-0874-04	SERIAL NO. PLATE
	B50-7670-20	INSTRUCTION MANUAL,JAPANESE
	B50-7671-20	INSTRUCTION MANUAL,ENGLISH
	E01-1404-05	CRT SOCKET
	E23-0565-05	EARTH WASHER
	E23-0567-04	EARTH BRACKET;COPPER
	E30-1644-15	BS POWER CORD
	E30-1818-05	JIS POWER CORD SET
	E30-1819-15	CEE POWER CORD SET
	E30-1820-05	UL/CSA POWER CORD SET
	E30-1821-05	SAA POWER CORD SET
	E31-0717-25	WIRE ASS'Y;INLET TO GND
	E31-5560-05	WIRE ASS'Y;HV
	E38-0068-05	WIRE ASS'Y;FOOT SWITCH BNC
	E38-0069-05	WIRE ASS'Y;FOOT SWITCH PANEL
	E38-0075-05	WIRE ASS'Y;+/-Y
	E38-0076-05	WIRE ASS'Y;+/-X
	E38-0077-05	WIRE ASS'Y;P2,G2
	E38-0078-05	WIRE ASS'Y;EXT Z
	E38-0079-05	WIRE ASS'Y;CH1 OUTPUT
	E38-0080-05	WIRE ASS'Y;VR1
	E38-0081-05	WIRE ASS'Y;VR2
	E38-0082-05	WIRE ASS'Y;CAL
	E38-0083-05	WIRE ASS'Y;R/O TO ATT
	F05-1224-05	FUSE(6X30MM) 1.2A/250V
	F05-8013-05	FUSE(5X20MM) T800MA/250V
	F05-8015-05	FUSE(6X30MM) 0.8A/250V
	F15-0733-04	FELT (CRT SHIELD)
	F20-0674-04	INSULATED SHEET,HIGH VOLTAGE
	H10-2901-02	FOAMED STYRENE PAD,FRONT
	H10-2902-12	FOAMED STYRENE PAD,REAR
	H20-1727-04	VINYL COVER
	H53-0031-04	CARTON BOX
	J31-0604-04	SPACER
	J61-0408-05	WIRE WRAPPING BAND
	J61-0509-05	WIRE WRAPPING BAND
	J61-0516-05	SUPPORT
	W03-2301-15	R/O PROBE, PC-31
C1	CC45CH2H330J	CAP. CERAMIC 33P 5% 500V
R1	RD14BB2C471J	RES. CARBON 470 5% 1/6W
1	A01-1194-12	CASE,TOP
2	A01-1195-32	CASE,BOTTOM
3	A13-0924-12	FRAME,RIGHT
4	A13-0925-22	FRAME,CENTER
5	A13-0926-22	FRAME,LEFT
6	A13-0927-13	FRAME,PCB SUPPORT
7	A13-0928-13	FRAME
8	A13-0929-03	FRAME
10	A20-2830-52	MOLDED PANEL ASS'Y
11	A21-1173-13	DECORATIVE PANEL
12	A21-1136-03	DECORATIVE PANEL
13	A23-1683-22	REAR PANEL
14	B11-0504-14	FILTER
15	B30-0979-05	LAMP ASS'Y;SCALE ILLUMINATION
16	B40-2935-03	NAME PLATE,MODEL
17	B41-0710-04	CAUTION LABEL;(HIGH VOLTAGE)
18	D19-0505-05	FLEXIBLE WIRE,FOR POWER SWITCH
19	G53-0015-14	BUSHING
20	E04-0259-05	BNC RECEPTACLE
21A	E18-0365-05	AC SELECTOR WITH 6X30MM FUSE
21B	E18-0366-15	AC SELECTOR WITH 5X20MM FUSE
22	E21-0660-04	TERMINAL,CAL
23	E21-0667-05	METAL TERMINAL
25	E31-5568-05	FLAT CABLE(AXM126)
26	E31-5569-05	FLAT CABLE(AXM120)
27	F07-0936-04	COVER ,HANDLE LATCH
28	F10-1604-04	SHIELD,R/O UNIT
29	F10-1605-13	SHIELD PLATE
30	F10-1606-03	SHIELD,HIGH VOLTAGE UNIT
31	F11-1209-02	SHIELD,CRT:FRONT
32	F11-1210-03	SHIELD,CRT:REAR
33	F20-0673-04	INSULATED SHEET
34	G02-0606-14	SPRING,FOR HANDLE
35	J02-0089-05	RUBBER FOOT(REAR)
36	J11-0508-05	CABLE CLAMP
37	J19-1656-03	HOLDER,COIL
38	J19-1657-04	WEDGE
39	J21-2906-05	GEAR,FOR HANDLE
40	J21-2907-05	RING,FOR HANDLE
41	J21-4642-04	BRACKET
42	J21-4613-04	BRACKET
43	J32-0887-04	BOSS,FOR POWER SWITCH
44	J21-4710-04	BRACKET
45	J61-0521-05	SUPPORT
46	K01-0528-05	HANDLE,CARRYING
47	K21-0898-23	KNOB
48	K23-0808-03	KNOB(18 USED)
49	K27-0504-04	BUTTON;GRAY
50	K27-0543-04	BUTTON(34 USED)
51	L01-9766-05	POWER TRANSFORMER
52	L39-0533-05	COIL,TRACE ROTATION
53	L76-0120-05	DELAY LINE
54	S40-1524-05	PUSH SWITCH,POWER
55	W01-0503-04	REAR RUBBER FOOT/CORD WRAP
56	X66-1050-01	PANEL UNIT
57	X68-1500-01	POWER SUPPLY UNIT
58	X68-1510-02	HIGH VOLTAGE UNIT
59	X69-1150-02	SWITCH UNIT
60	X73-1760-01	VERTICAL PREAMP UNIT
61	X74-1480-02	HORIZONTAL UNIT
62	X75-1180-01	ATT. UNIT
63	X77-1490-01	R/O UNIT
64	X77-1500-01	CONNECTION UNIT
65	X80-1100-02	FINAL UNIT
66	X81-2330-02	VR UNIT
67	X76-1400-00	LINE COUNTER UNIT
68	J59-0403-05	NYLON RIVET (ILLUMI)
69	J19-1660-05	SUPPORT,FOR PCB
70	150XTM31A	CRT

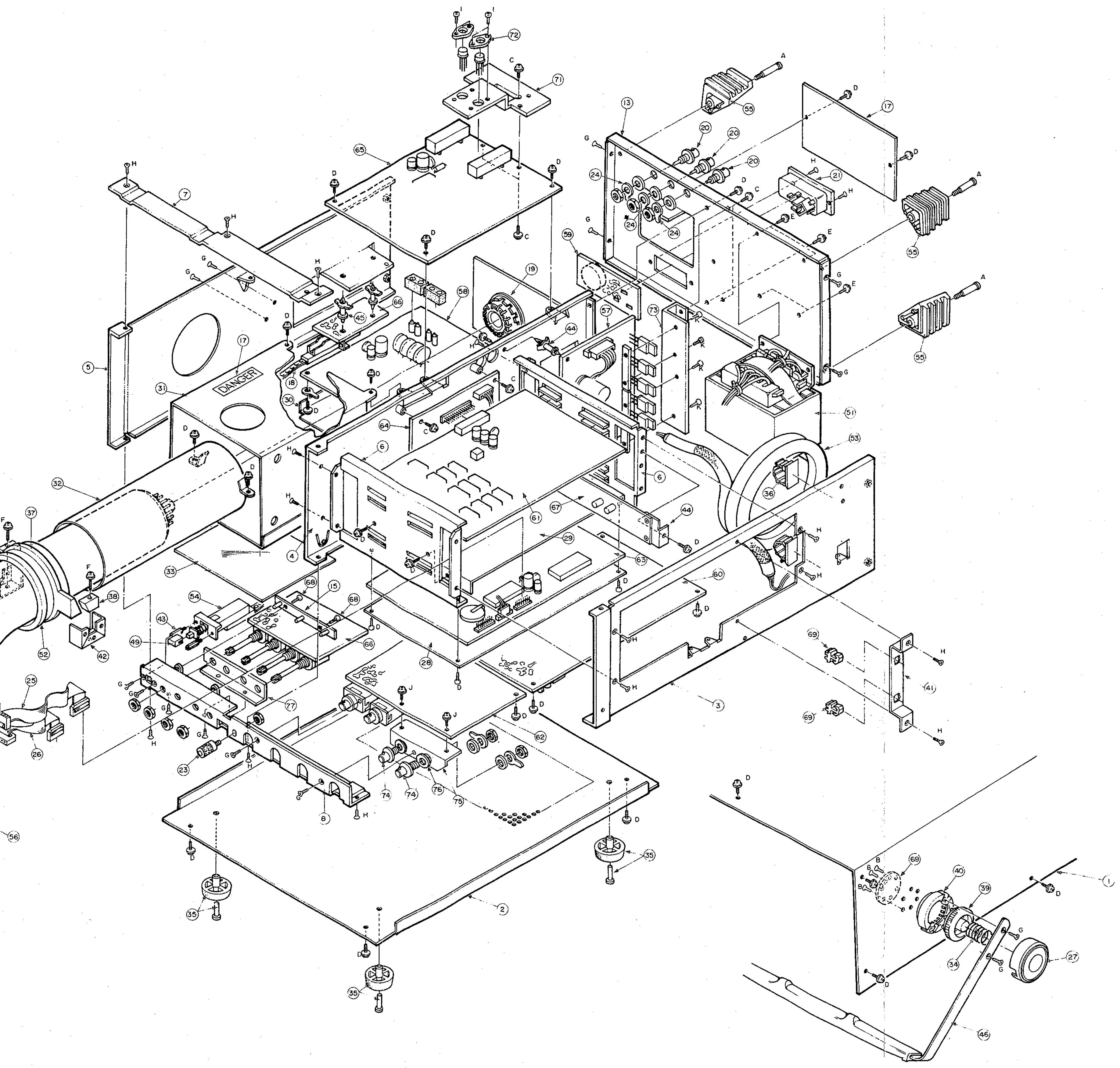
MODEL PC-31 (LOW CAPACITY PROBE)



ITEM	DESCRIPTION	PARTS NO.
①	Ground Wire Assembly	E30-1883-08
②	Retractable Hook Tip	E29-0540-08
③	Marker (Orange)	B42-1950-08

DISASSEMBLY

	Parts No.	Parts Name	Figure
A	N08-0611-04	Cord wrapping screw	
B	N09-0705-05	Hexagon socket flat head screw (M4×8)	
C	N09-0718-05	Sems screw (M3×6)	
D	N09-0739-05	Sems taptite screw (3×8)	
E	N09-0720-05	Sems screw (M4×10)	
F	N09-0733-15	Sems screw (M3×20)	
G	N32-3008-41	Flat head screw (M3×8)	
H	N88-3008-41	Flat head taptite screw (3×8)	
I	N89-3008-41	Binding head taptite screw (3×8)	
J	N35-3006-41	Binding head screw (M3×6)	
K	N09-0731-05	Sems screw (M3×12)	



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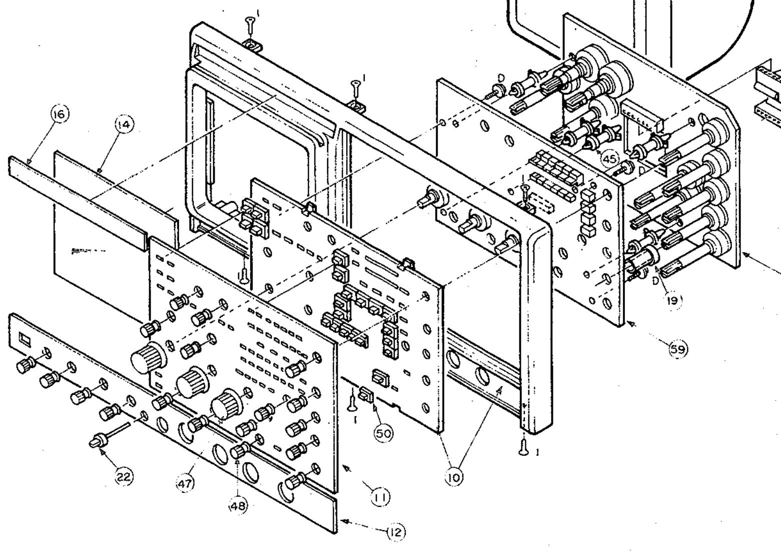

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PARTS LIST

PANEL UNIT

X66-1050-01

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J61-0529-05	SUPPORT			
	J73-0011-13	PCB (UNMOUNTED)			
	N09-0739-05	SCREW,SEMS BINDING TAPTITE 3X8			
	N19-0713-05	WASHER			
C1	C91-0757-05	CAP. CERAMIC	1000P	10%	50V
C2	C91-0757-05	CAP. CERAMIC	1000P	10%	50V
C3	C91-0757-05	CAP. CERAMIC	1000P	10%	50V
C4	C91-0757-05	CAP. CERAMIC	1000P	10%	50V
C5	C91-0757-05	CAP. CERAMIC	1000P	10%	50V
C6	C91-0757-05	CAP. CERAMIC	1000P	10%	50V
C7	C91-0757-05	CAP. CERAMIC	1000P	10%	50V
C8	C91-0757-05	CAP. CERAMIC	1000P	10%	50V
D1	MA700	DIODE			
D2	MA700	DIODE			
D3	1SS132	DIODE			
J31	E31-5555-05	LEAD WIRE WITH CONNECTOR			
P2	E40-7038-05	PIN CONNECTOR	26P		
Q1	2SC2785(F)	TR. SI, NPN			
Q2	2SA1175(F)	TR. SI, PNP			
Q3	2SC2785(F)	TR. SI, NPN			
Q4	2SA1175(F)	TR. SI, PNP			
Q5	NO USE				
Q6	2SC2785(F)	TR. SI, NPN			
Q7	2SC2785(F)	TR. SI, NPN			
R1	RN14BK2C2202F	RES. METAL FILM	22K	1%	1/6W
R2	RN14BK2C9103F	RES. METAL FILM	910K	1%	1/6W
R3	RN14BK2C9103F	RES. METAL FILM	910K	1%	1/6W
R4	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R5	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R6	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R7	RN14BK2C2202F	RES. METAL FILM	22K	1%	1/6W
R8	RN14BK2C9103F	RES. METAL FILM	910K	1%	1/6W
R9	RN14BK2C9103F	RES. METAL FILM	910K	1%	1/6W
R10	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R11	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R12	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R13	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R14	RN14BK2C1802F	RES. METAL FILM	18K	1%	1/6W
R15	RD14BB2E220J	RES. CARBON	22	5%	1/4W
R16	RN14BK2C2002F	RES. METAL FILM	20K	1%	1/6W
R17	RN14BK2C4303F	RES. METAL FILM	430K	1%	1/6W
R18	RN14BK2C5102F	RES. METAL FILM	51K	1%	1/6W
R19	RN14BK2C3003F	RES. METAL FILM	300K	1%	1/6W
R20	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R21	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R22	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R23	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
U1	NJM4558D	IC,DUAL OP AMP			
VR1	R05-3525-15	V.R.	20K B		
VR2	R05-3525-15	V.R.	20K B		
VR3	R05-3525-15	V.R.	20K B		
VR4	R05-3525-15	V.R.	20K B		
VR5	R05-3525-15	V.R.	20K B		
VR6	R05-3525-15	V.R.	20K B		
VR7	R05-3525-15	V.R.	20K B		
VR8	R05-3525-15	V.R.	20K B		
VR9	R05-3525-15	V.R.	20K B		
VR10	R05-3525-15	V.R.	20K B		
VR11	R10-3504-15	ENDLESS VOLUME	2X10K B		
VR12	R10-3504-15	ENDLESS VOLUME	2X10K B		
VR13	R10-3504-15	ENDLESS VOLUME	2X10K B		
VR14	R05-3525-15	V.R.	20K B		

POWER SUPPLY UNIT

X68-1500-01

REF.NO	PARTS NO	NAME & DESCRIPTION			
	F01-0865-14	HEAT SINK			
	J25-5227-13	PCB (UNMOUNTED)			
	N09-0731-05	SCREW,SEMS PAN HD M3X12			
	N14-0626-04	NUT			
	N17-1030-41	LOCK WASHER	M3		
	N30-3008-41	SCREW, PAN HD	M3X8		
C1	CE04W2E4R7M	CAP. ELECTRO	4.7	20%	250V
C2	CE04EW2A220M	CAP. ELECTRO	22	20%	100V
C3	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C4	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C5	CE04EW1E101M	CAP. ELECTRO	100	20%	25V
C6	CE04EW1A102M	CAP. ELECTRO	1000	20%	10V
C7	CE04W2E470M	CAP. ELECTRO	47	20%	250V
C8	CE04EW2A471M	CAP. ELECTRO	470	20%	100V
C9	C90-0973-05	CAP. ELECTRO	6800	20%	25V
C10	C90-0973-05	CAP. ELECTRO	6800	20%	25V
C11	C90-0982-05	CAP. ELECTRO	10000	20%	16V
C12	CE04BW1H010M	CAP. ELECTRO	1	20%	50V
C13	CE04EW1H331M	CAP. ELECTRO	330	20%	50V
C14	CE04EW1V471M	CAP. ELECTRO	470	20%	35V
C15	CE04EW1E101M	CAP. ELECTRO	100	20%	25V
C16	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C17	NO USE				
C18	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C19	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D3	MTZ13JB	DIODE, ZENER	12.88V		
D4	MTZ13JB	DIODE, ZENER	12.88V		
D5	MTZ5.1JB	DIODE, ZENER	5.07V		
D6	S1VB60	DIODE,STACK			
D7	S1VB60	DIODE,STACK			
D8	S4VB40F	DIODE, BRIDGE			
D9	S4VB40F	DIODE, BRIDGE			
D10	1SR35-200A	DIODE			
D11	1SR35-200A	DIODE			
D12	MTZ20JC	DIODE, ZENER	19.73V		
D13	MTZ7.5JA	DIODE, ZENER	7.04V		
P17	E40-5068-05	PIN CONNECTOR	11P		
P18	E40-7040-05	PIN CONNECTOR	13P		
Q1	2SD1409	TR. SI, NPN			
Q2	2SC2271(D)	TR. SI, NPN			
Q3	2SD1409	TR. SI, NPN			
Q4	2SC2271(D)	TR. SI, NPN			
Q5	2SB1133(S)	TR. SI, PNP			
Q6	2SD1666(S)	TR. SI, NPN			
Q7	2SB1133(S)	TR. SI, PNP			
Q8	2SA684(Q)	TR. SI, PNP			
R1	RN14BK2C1302F	RES. METAL FILM	13K	1%	1/6W
R2	RN14BK2C1803F	RES. METAL FILM	180K	1%	1/6W
R3	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R4	RN14BK2C2002F	RES. METAL FILM	20K	1%	1/6W
R5	RN14BK2C1203F	RES. METAL FILM	120K	1%	1/6W
R6	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R7	RN14BK2C2002F	RES. METAL FILM	20K	1%	1/6W
R8	RN14BK2C2002F	RES. METAL FILM	20K	1%	1/6W
R9	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R10	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R11	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R12	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R13	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R14	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R15	RN14BK2C2002F	RES. METAL FILM	20K	1%	1/6W
R16	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R17	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R18	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R19	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R20	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R21	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R22	NO USE				
R23	RD14BB2C362J	RES. CARBON	3.6K	5%	1/6W
R24	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
R25	R92-1402-05	RES. SPECIAL POWER	24	5%	2W
R26	NO USE				
R27	R92-1402-05	RES. SPECIAL POWER	24	5%	2W
R28	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R29	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R30	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R31	R92-1421-05	RES. SPECIAL POWER	7.5	5%	3W
R32	RN14BK2C1502F	RES. METAL FILM	15K	1%	1/6W
R33	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R34	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R35	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R36	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R901	RD14BB2C331J	RES. CARBON	330	5%	1/6W
U1	NJM4556S	IC,DUAL OP AMP			
U2	NJM4556S	IC,DUAL OP AMP			
U3	NJM4556S	IC,DUAL OP AMP			
VR1	R12-1551-05	RES. SEMI FIXED 1KB			

HIGH VOLTAGE UNIT

X68-1510-02

REF.NO	PARTS NO	NAME & DESCRIPTION			
	F01-0813-05	HEAT SINK (CONVERTER)			
	F10-1601-04	SHIELD PLATE			
	F15-0727-04	HOLDER (NEON LAMP)			
	J25-5226-13	PCB (UNMOUNTED)			
	N30-3006-41	SCREW, PAN HD	M3X6		
C1	CE04EW1E221M	CAP. ELECTRO	220	20%	25V
C2	CE04EW1E221M	CAP. ELECTRO	220	20%	25V
C3	CK45B1H472K	CAP. CERAMIC	4700P	10%	50V
C4	CK45FB1H222K	CAP. CERAMIC	2200P	10%	50V
C5	CC45SL2H101J	CAP. CERAMIC	100P	5%	500V
C6	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C7	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C8	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C9	CK45B2H102K	CAP. CERAMIC	1000P	10%	500V
C10	CF92V1H224J	CAP. POLYESTER	0.22	5%	50V
C11	CF92V1H224J	CAP. POLYESTER	0.22	5%	50V
C12	CK45E3F102P	CAP. CERAMIC	1000P		3.1K
C13	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C14	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C15	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C16	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C17	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C18	CK45B2H102K	CAP. CERAMIC	1000P	10%	500V
C19	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C20	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C21	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
C22	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
C23	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C24	CC45CH2H020C	CAP. CERAMIC	2P	0.25P	500V
C25	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
C26	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C27	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C31	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C32	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C33	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C34	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C35	CE04W2C2R2M	CAP. ELECTRO	2.2	20%	160V
C36	CE04W2C2R2M	CAP. ELECTRO	2.2	20%	160V
C37	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C38	CE04EW1C101M	CAP. ELECTRO	100	20%	16V
C39	CE04EW1C101M	CAP. ELECTRO	100	20%	16V
C40	CE04EW1C101M	CAP. ELECTRO	100	20%	16V
C43	CE04EW0J102M	CAP. ELECTRO	1000	20%	6.3V
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D3	1SS132	DIODE			
D4	1SR35-200A	DIODE			
D5	1SR35-200A	DIODE			
D6	1SS83	DIODE			
D7	1SS83	DIODE			
D8	1SR35-200A	DIODE			
D9	1SR35-200A	DIODE			
D10	1SS83	DIODE			
D11	1SS132	DIODE			
D12	1SS132	DIODE			
D13	1SS83	DIODE			

REF.NO	PARTS NO	NAME & DESCRIPTION			
L1	L40-3925-04	FERRI INDUCTOR	3.9MH	5%	
L2	L40-1011-04	FERRI INDUCTOR	100UH	10%	
L3	L40-1011-04	FERRI INDUCTOR	100UH	10%	
L4	L40-1545-06	FERRI INDUCTOR	150MH	5%	
NL1	NE-2B	NEON LAMP			
NL2	NE-2B	NEON LAMP			
NL3	NE-2B	NEON LAMP			
NL4	NE-2B	NEON LAMP			
P19	E40-5069-05	PIN CONNECTOR	12P		
P22	E40-3237-05	PIN CONNECTOR	2P		
P23	E40-0503-05	PIN CONNECTOR	5P		
P24	E40-3238-05	PIN CONNECTOR	3P		
P25	E40-3239-05	PIN CONNECTOR	4P		
P26	E40-5067-05	PIN CONNECTOR	10P		
Q1	2SD613(E)	TR. SI, NPN			
Q2	2SA1175(F)	TR. SI, PNP			
Q3	2SA1208(S,T)	TR. SI, PNP			
Q4	2SC2910(S,T)	TR. SI, NPN			
Q5	2SA1209(S,T)	TR. SI, PNP			
Q6	2SC2911(S,T)	TR. SI, NPN			
Q7	2SA1175(F)	TR. SI, PNP			
Q8	2SC3315(C)	TR. SI, NPN			
R1	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R2	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R3	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R4	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R5	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R6	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R7	R92-1128-05	RES. FIXED	9.1M	1%	1W
R8	R92-1128-05	RES. FIXED	9.1M	1%	1W
R9	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R10	R92-1034-05	RES. METAL FILM	47M	5%	1/2W
R11	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R12	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R13	R92-1034-05	RES. METAL FILM	47M	5%	1/2W
R14	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R15	RD14BB2C823J	RES. CARBON	82K	5%	1/6W
R16	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R17	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
R18	RD14BB2C114J	RES. CARBON	110K	5%	1/6W
R19	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R20	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R21	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R22	RD14BB2C134J	RES. CARBON	130K	5%	1/6W
R23	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R24	RD14BB2C134J	RES. CARBON	130K	5%	1/6W
R25	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R26	RD14BB2C913J	RES. CARBON	91K	5%	1/6W
R27	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R28	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R29	RD14BB2C133J	RES. CARBON	13K	5%	1/6W
R30	RD14BB2C203J	RES. CARBON	20K	5%	1/6W
R34	R92-1050-05	RES. METAL FILM	5.1M	5%	1/2W
R35	R92-1422-05	RES. FIXED	3.9M	5%	1/2W
R36	RD14BB2C203J	RES. CARBON	20K	5%	1/6W
R37	RN14BK2E1804F	RES. METAL FILM	1.8M	1%	1/4W
R38	NO USE				
R39	RD14BB2C204J	RES. CARBON	200K	5%	1/6W
R40	RD14BB2C684J	RES. CARBON	680K	5%	1/6W
R41	RD14BB2C684J	RES. CARBON	680K	5%	1/6W
R42	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R43	RD14BB2C6R8J	RES. CARBON	6.8	5%	1/6W
R44	R92-1126-05	RES. FIXED	4.3M	5%	1/2W
R47	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R48	RD14BB2C101J	RES. CARBON	100	5%	1/6W
U1	NJM4558D	IC,DUAL OP AMP			
VR1	R12-5524-05	RES. SEMI FIXED 100KB			
VR2	R12-8501-05	RES. SEMI FIXED 2.2MB			
W1	W02-0458-05	HIGH VOLTAGE UNIT			

PARTS LIST

SWITCH UNIT

X69-1150-02

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J73-0012-03	PCB (UNMOUNTED)			
C4	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C5	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C6	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C7	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C8	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C9	CK45F1H103Z	CAP. CERAMIC	0.01		50V
D38	B30-0964-05	LED			
D39	B30-0965-05	LED			
D40	B30-0964-05	LED			
D41	B30-0965-05	LED			
D42	B30-0964-05	LED			
D43	B30-0965-05	LED			
D44	B30-0965-05	LED			
D45	1SS132	DIODE			
D46	1SS132	DIODE			
D47	1SS132	DIODE			
D48	1SS132	DIODE			
D49	1SS132	DIODE			
P1	E40-7036-05	PIN CONNECTOR	20P		
P37	E40-3237-05	PIN CONNECTOR	2P		
R15	R90-0652-05	RES. NETWORK	6X10K	5%	
R16	R90-0653-05	RES. NETWORK	8X10K	5%	
R17	R90-0614-05	RES. NETWORK	8X390	5%	
R18	R90-0639-05	RES. NETWORK	6X390	5%	
R19	R90-0639-05	RES. NETWORK	6X390	5%	
R20	R90-0639-05	RES. NETWORK	6X390	5%	
R21	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R22	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R23	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R24	RD14BB2C391J	RES. CARBON	390	5%	1/6W
S1	W02-0497-05	ROTARY ENCORDER			
S2	W02-0497-05	ROTARY ENCORDER			
S3	W02-0497-05	ROTARY ENCORDER			
S4	S40-2525-05	SWITCH			
S5	S40-2525-05	SWITCH			
S6	S40-2525-05	SWITCH			
S7	S40-2525-05	SWITCH			
S8	S40-2525-05	SWITCH			
S9	S40-2525-05	SWITCH			
S10	S40-2525-05	SWITCH			
S11	S40-2525-05	SWITCH			
S12	S40-2525-05	SWITCH			
S13	S40-2525-05	SWITCH			
S14	S40-2525-05	SWITCH			
S15	S40-2525-05	SWITCH			
S16	S40-2525-05	SWITCH			
S17	S40-2525-05	SWITCH			
S18	S40-2525-05	SWITCH			
S19	S40-2525-05	SWITCH			
S20	S40-2525-05	SWITCH			
S21	S40-2525-05	SWITCH			
S22	S40-2525-05	SWITCH			
S23	S40-2525-05	SWITCH			
S24	S40-2525-05	SWITCH			
S25	S40-2525-05	SWITCH			
S26	S40-2525-05	SWITCH			
S27	S40-2525-05	SWITCH			
S28	S40-2525-05	SWITCH			
S29	S40-2525-05	SWITCH			
S30	S40-2525-05	SWITCH			
S31	S40-2525-05	SWITCH			
S32	S40-2525-05	SWITCH			
S33	S40-2525-05	SWITCH			
S34	S40-2525-05	SWITCH			
S35	S40-2525-05	SWITCH			
S36	S40-2525-05	SWITCH			
S37	S40-2525-05	SWITCH			
U2	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U3	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U4	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U5	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U6	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U7	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U8	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U9	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			

VERTICAL PREAMP UNIT

X73-1760-01

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E31-5576-05	WIRE ASS'Y(GND TO GND)			
	E31-5577-05	WIRE ASS'Y(NO.A,B,C,D)			
	F07-0949-04	COVER			
	J61-0408-05	WIRE WRAPPING BAND			
	J73-0010-02	PCB (UNMOUNTED)			
C1	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C2	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C3	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C4	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C5	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C6	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C7	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C8	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C9	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C19	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C20	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C21	CE04EW1C100M	CAP. ELECTRO	10	20%	16V
C22	CE04EW1C100M	CAP. ELECTRO	10	20%	16V
C23	NO USE				
C24	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C25	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C26	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C27	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C28	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C29	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C30	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C31	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C32	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C33	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C34	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C35	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C36	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C37	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C38	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C39	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C40	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C41	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C42	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C43	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C44	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C45	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C46	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C103	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C104	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C105	NO USE				
C106	CC45FCH1H060D	CAP. CERAMIC	6P	0.5P	50V
C107	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C108	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C109	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C110	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C111	CC45FCH1H030C	CAP. CERAMIC	3P	0.25P	50V
C112	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C113	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C114	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C203	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C204	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C205	NO USE				
C206	CC45FCH1H060D	CAP. CERAMIC	6P	0.5P	50V
C207	NO USE				
C208	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C209	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C210	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C211	CC45FCH1H030C	CAP. CERAMIC	3P	0.25P	50V
C212	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C213	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C214	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C301	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C401	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C402	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C501	CC45FCH1H680J	CAP. CERAMIC	68P	5%	50V
C502	CC45FCH1H680J	CAP. CERAMIC	68P	5%	50V
C503	CC45CH1H120J	CAP. CERAMIC	12P	5%	50V
C504	CC45CH1H120J	CAP. CERAMIC	12P	5%	50V
C505	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C506	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
C509	CC45SL1H471J	CAP. CERAMIC	470P	5%	50V
C510	CC45SL1H471J	CAP. CERAMIC	470P	5%	50V
C511	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C512	NO USE				
C513	CC45FCH1H040C	CAP. CERAMIC	4P	0.25P	50V
C514	CC45FCH1H040C	CAP. CERAMIC	4P	0.25P	50V
C515	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C516	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C517	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C518	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C519	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C520	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C601	CC45FCH1H100D	CAP. CERAMIC	10P	0.5P	50V
C602	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C603	CC45FCH1H120J	CAP. CERAMIC	12P	5%	50V
C604	CC45FCH1H120J	CAP. CERAMIC	12P	5%	50V
C605	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C606	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C607	CE04HW1E220M	CAP. ELECTRO	22	20%	25V
C608	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C609	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C610	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C611	NO USE				
C612	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C701	CC45CH1H470J	CAP. CERAMIC	47P	5%	50V
C702	CC45CH1H470J	CAP. CERAMIC	47P	5%	50V
C703	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C704	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C705	CC45FCH1H220J	CAP. CERAMIC	22P	5%	50V
C706	CC45FCH1H220J	CAP. CERAMIC	22P	5%	50V
C707	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C708	NO USE				
C709	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C710	NO USE				
C711	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C714	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C715	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C716	CE04EW1C330M	CAP. ELECTRO	33	20%	16V
C720	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C721	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C801	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C802	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C803	CC45CH1H0R5C	CAP. CERAMIC	0.5P	0.25P	50V
C804	CC45CH1H0R5C	CAP. CERAMIC	0.5P	0.25P	50V
C805	CC45CH1H330J	CAP. CERAMIC	33P	5%	50V
C806	CC45SL1H470J	CAP. CERAMIC	47P	5%	50V
C807	CC45SL1H470J	CAP. CERAMIC	47P	5%	50V
C808	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C809	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C810	CQ92FM1H473K	CAP. MYLAR	0.047	10%	50V
C811	CQ92FM1H473K	CAP. MYLAR	0.047	10%	50V
C812	CQ92FM1H473K	CAP. MYLAR	0.047	10%	50V
C813	CQ92FM1H473K	CAP. MYLAR	0.047	10%	50V
C901	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C902	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C903	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C904	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C905	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C906	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C907	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C908	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C909	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C910	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C911	CQ92M1H103K	CAP. MYLAR	0.01	10%	50V
C912	CC45CH1H030C	CAP. CERAMIC	3P	0.25P	50V
C913	CC45CH1H030C	CAP. CERAMIC	3P	0.25P	50V
D101	1SS132	DIODE			
D102	1SS132	DIODE			
D201	1SS132	DIODE			
D202	1SS132	DIODE			
D501	1SS132	DIODE			
D502	1SS132	DIODE			
D503	1SS132	DIODE			
D504	1SS132	DIODE			
D505	1SS132	DIODE			

REF.NO	PARTS NO	NAME & DESCRIPTION	
D506	1SS132	DIODE	
D507	1SS132	DIODE	
D508	1SS132	DIODE	
D509	1SS132	DIODE	
D510	MTZ10JC	DIODE, ZENER	9.95V
D511	1SS132	DIODE	
D512	MTZ5.1JB	DIODE, ZENER	5.07V
D601	DAP401	DIODE ARRAY	
D602	DAP401	DIODE ARRAY	
D603	1SS132	DIODE	
K101	S51-2508-05	RELAY	
K102	S51-2508-05	RELAY	
K201	S51-2508-05	RELAY	
K202	S51-2508-05	RELAY	
P5	E40-3238-05	PIN CONNECTOR	3P
P6	E40-3238-05	PIN CONNECTOR	3P
P7	E38-0089-05	WIRE ASS'Y	
P8	E38-0089-05	WIRE ASS'Y	
P9	E40-3238-05	PIN CONNECTOR	3P
P10	E40-7039-05	PIN CONNECTOR	20P
P11	E40-3238-05	PIN CONNECTOR	3P
P30	E40-3237-05	PIN CONNECTOR	2P
Q1	2SA1005(K)	TR. SI, PNP	
Q2	2SA1005(K)	TR. SI, PNP	
Q3	2SA1005(K)	TR. SI, PNP	
Q4	2SA1005(K)	TR. SI, PNP	
Q5	2SA1005(K)	TR. SI, PNP	
Q6	2SA1005(K)	TR. SI, PNP	
Q7	2SA1005(K)	TR. SI, PNP	
Q8	2SA1005(K)	TR. SI, PNP	
Q101	2SC4072	TR. SI, NPN	
Q102	2SC4072	TR. SI, NPN	
Q103	2SC3779(D)	TR. SI, NPN	
Q104	2SC3779(D)	TR. SI, NPN	
Q105	2SC3315(C)	TR. SI, NPN	
Q106	2SC3315(C)	TR. SI, NPN	
Q107	2SC3315(C)	TR. SI, NPN	
Q108	2SA1161	TR. SI, PNP	
Q109	2SA1161	TR. SI, PNP	
Q110	2SC4049	TR. SI, NPN	
Q111	2SC4049	TR. SI, NPN	
Q112	2SC3779(D)	TR. SI, NPN	
Q113	2SC3779(D)	TR. SI, NPN	
Q114	2SC3779(D)	TR. SI, NPN	
Q115	2SC3779(D)	TR. SI, NPN	
Q116	2SC2785(F)	TR. SI, NPN	
Q117	2SC3779(D)	TR. SI, NPN	
Q118	2SC3779(D)	TR. SI, NPN	
Q119	2SC3779(D)	TR. SI, NPN	
Q120	2SC3779(D)	TR. SI, NPN	
Q201	2SC4072	TR. SI, NPN	
Q202	2SC4072	TR. SI, NPN	
Q203	2SC3779(D)	TR. SI, NPN	
Q204	2SC3779(D)	TR. SI, NPN	
Q205	2SC3315(C)	TR. SI, NPN	
Q206	2SC3315(C)	TR. SI, NPN	
Q207	2SC3315(C)	TR. SI, NPN	
Q208	2SA1161	TR. SI, PNP	
Q209	2SA1161	TR. SI, PNP	
Q210	2SC4049	TR. SI, NPN	
Q211	2SC4049	TR. SI, NPN	
Q212	2SC3779(D)	TR. SI, NPN	
Q213	2SC3779(D)	TR. SI, NPN	
Q214	2SC3779(D)	TR. SI, NPN	
Q215	2SC3779(D)	TR. SI, NPN	
Q216	2SC2785(F)	TR. SI, NPN	
Q217	2SC3779(D)	TR. SI, NPN	
Q218	2SC3779(D)	TR. SI, NPN	
Q219	2SC3779(D)	TR. SI, NPN	
Q220	2SC3779(D)	TR. SI, NPN	
Q301	2SC3779(D)	TR. SI, NPN	
Q302	2SC3779(D)	TR. SI, NPN	
Q303	2SC3779(D)	TR. SI, NPN	
Q304	2SC3779(D)	TR. SI, NPN	
Q401	2SC3779(D)	TR. SI, NPN	
Q402	2SC3779(D)	TR. SI, NPN	

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
Q403	2SC3779(D)	TR. SI, NPN			
Q404	2SC3779(D)	TR. SI, NPN			
Q501.	2SA1206	TR. SI, PNP			
Q502	2SA1206	TR. SI, PNP			
Q503	2SC3315(C)	TR. SI, NPN			
Q504	2SC3315(C)	TR. SI, NPN			
Q505	2SA1206	TR. SI, PNP			
Q506	2SA1206	TR. SI, PNP			
Q507	2SC3315(C)	TR. SI, NPN			
Q508	2SC3315(C)	TR. SI, NPN			
Q509	2SA1206	TR. SI, PNP			
Q510	2SA1206	TR. SI, PNP			
Q511	2SC3315(C)	TR. SI, NPN			
Q512	2SC3315(C)	TR. SI, NPN			
Q513	2SA1206	TR. SI, PNP			
Q514	2SA1206	TR. SI, PNP			
Q515	2SC3315(C)	TR. SI, NPN			
Q516	2SC3315(C)	TR. SI, NPN			
Q517	NO USE				
Q518	2SC3732(L)	TR. SI, NPN			
Q519	2SA1206	TR. SI, PNP			
Q520	2SA1206	TR. SI, PNP			
Q521	2SA1175(F)	TR. SI, PNP			
Q522	2SA1175(F)	TR. SI, PNP			
Q523	2SA1175(F)	TR. SI, PNP			
Q524	2SC3779(D)	TR. SI, NPN			
Q525	2SC3779(D)	TR. SI, NPN			
Q526	2SA1206	TR. SI, PNP			
Q527	2SA1206	TR. SI, PNP			
Q528	2SA1161	TR. SI, PNP			
Q529	2SA1161	TR. SI, PNP			
Q601	2SA1206	TR. SI, PNP			
Q602	2SA1206	TR. SI, PNP			
Q603	2SC3779(D)	TR. SI, NPN			
Q604	2SA1206	TR. SI, PNP			
Q605	2SA1206	TR. SI, PNP			
Q606	2SA1206	TR. SI, PNP			
Q607	2SC3779(D)	TR. SI, NPN			
Q608	2SA1206	TR. SI, PNP			
Q609	2SA1206	TR. SI, PNP			
Q610	2SA1206	TR. SI, PNP			
Q611	2SC3779(D)	TR. SI, NPN			
Q612	2SA1206	TR. SI, PNP			
Q613	2SA1206	TR. SI, PNP			
Q614	2SA1206	TR. SI, PNP			
Q615	2SC3779(D)	TR. SI, NPN			
Q616	2SA1206	TR. SI, PNP			
Q617	2SA1161	TR. SI, PNP			
Q618	2SA1161	TR. SI, PNP			
Q619	2SA1175(F)	TR. SI, PNP			
Q620	2SA1175(F)	TR. SI, PNP			
Q621	2SC3779(D)	TR. SI, NPN			
Q622	2SC3779(D)	TR. SI, NPN			
Q623	2SC2785(F)	TR. SI, NPN			
Q624	2SC3315(C)	TR. SI, NPN			
Q625	2SC3315(C)	TR. SI, NPN			
Q626	2SC3315(C)	TR. SI, NPN			
Q627	2SC3315(C)	TR. SI, NPN			
Q628	2SC3315(C)	TR. SI, NPN			
Q629	2SC3315(C)	TR. SI, NPN			
Q630	2SC3315(C)	TR. SI, NPN			
Q631	2SC3315(C)	TR. SI, NPN			
Q632	2SC3779(D)	TR. SI, NPN			
Q633	2SC3779(D)	TR. SI, NPN			
R1	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R2	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R3	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R4	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R5	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R6	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R7	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R8	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R9	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R10	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R11	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R12	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R13	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R14	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R101	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R102	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R103	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R104	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R105	NO USE				
R106	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R107	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R108	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R109	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R110	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R111	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R112	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R117	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R118	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R119	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R120	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R121	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R122	RD14BB2C750J	RES. CARBON	75	5%	1/6W
R123	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R124	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R125	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R126	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R127	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R128	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R129	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R130	NO USE				
R131	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R132	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R133	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R134	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R135	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R136	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R137	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R138	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R139	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R140	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R141	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R142	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R143	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R144	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R145	RN14BK2C1500D	RES. METAL FILM	150	0.5%	1/6W
R146	RN14BK2C1500D	RES. METAL FILM	150	0.5%	1/6W
R147	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R148	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R149	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R150	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R151	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R152	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R153	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R154	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R155	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R156	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R157	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R158	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R159	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R160	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R161	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R162	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R163	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R164	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R167	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R168	NO USE				
R169	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R170	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R171	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R172	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R173	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R174	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R175	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R176	RN14BK2C1301F	RES. METAL FILM	1.3K	1%	1/6W
R177	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R178	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R179	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R180	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R181	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R182	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R183	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R184	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R185	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R186	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R187	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R190	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R201	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R202	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R203	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R204	NO USE				

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R205	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R206	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R207	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R208	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R209	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R210	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R211	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R212	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R217	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R218	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R219	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R220	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R221	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R222	RD14BB2C750J	RES. CARBON	75	5%	1/6W
R223	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R224	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R225	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R226	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R227	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R228	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R229	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R230	NO USE				
R231	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R232	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R233	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R234	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R235	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R236	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R237	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R238	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R239	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R240	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R241	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R242	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R243	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R244	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R245	RN14BK2C1500D	RES. METAL FILM	150	0.5%	1/6W
R246	RN14BK2C1500D	RES. METAL FILM	150	0.5%	1/6W
R247	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R248	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R249	NO USE				
R250	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R251	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R252	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R253	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R254	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R255	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R256	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R257	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R258	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R259	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R260	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R261	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R262	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R263	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R264	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R267	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R268	NO USE				
R269	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R270	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R271	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R272	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R273	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R274	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R275	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R276	RN14BK2C1301F	RES. METAL FILM	1.3K	1%	1/6W
R277	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R278	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R279	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R280	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R281	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R282	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R283	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R284	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R285	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R286	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R287	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R290	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R301	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R302	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R303	RD14BB2C220J	RES. CARBON	22	5%	1/6W

REF.NO	PARTS NO	NAME & DESCRIPTION			
R304	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R305	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R306	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R307	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R308	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R309	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R310	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R311	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R312	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R313	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R314	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R315	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R401	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R402	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R403	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R404	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R405	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R406	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R407	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R408	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R409	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R410	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R411	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R412	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R413	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R414	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R415	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R501	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R502	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R503	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R504	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R505	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R506	RD14BB2C433J	RES. CARBON	43K	5%	1/6W
R507	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R508	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R509	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R510	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R511	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R512	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R513	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R514	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R515	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R516	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R517	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R518	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R519	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R520	RD14BB2C433J	RES. CARBON	43K	5%	1/6W
R521	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R522	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R523	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R524	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R525	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R526	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R527	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R528	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R529	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R530	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R531	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R532	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R533	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R534	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R535	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R536	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R537	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R538	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R539	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R540	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R541	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R542	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R543	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R544	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R545	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R546	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R547	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R548	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R549	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R550	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R551	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R552	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R553	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R554	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R555	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R556	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R557	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R558	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R559	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R560	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R561	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R562	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R563	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R564	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R565	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R566	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R567	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R568	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R569	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R570	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R571	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R572	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R573	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R574	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R575	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R576	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R577	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R578	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R579	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R580	RD14BB2C113J	RES. CARBON	11K	5%	1/6W
R581	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R582	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
R583	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R584	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R585	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R586	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R587	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R588	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R589	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R590	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R591	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R592	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R593	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R594	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R595	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R596	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R597	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R598	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R599	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R600	NO USE				
R601	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R602	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R603	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R604	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R605	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R606	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R607	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R608	NO USE				
R609	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R610	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R611	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R612	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R613	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R614	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R615	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R616	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R617	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R618	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R619	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R620	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R621	NO USE				
R622	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R623	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R624	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R625	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R626	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R627	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R628	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R629	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R630	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R631	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R632	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R633	RN14BK2C1300F	RES. METAL FILM	130	1%	1/6W
R634	NO USE				
R635	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R636	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R637	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R638	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R639	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R640	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R641	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R642	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R643	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R644	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R645	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R646	RN14BK2C1300F	RES. METAL FILM	130	1%	1/6W
R647	NO USE				
R648	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R649	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R650	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R651	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R652	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R653	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R654	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R655	R90-0657-05	RES. MULTIPLE	8X330	1%	
R656	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R657	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R658	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R659	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R660	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R661	RN14BK2C2701F	RES. METAL FILM	2.7K	1%	1/6W
R662	RN14BK2C2701F	RES. METAL FILM	2.7K	1%	1/6W
R663	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R664	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R665	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R666	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R667	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R668	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R669	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R670	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R671	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R672	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R673	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R674	RN14BK2C2701F	RES. METAL FILM	2.7K	1%	1/6W
R675	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R676	E31-2170-05	JUMPING WIRE			
R677	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R678	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R679	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R680	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R681	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R682	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R683	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R684	RD14BB2C300J	RES. CARBON	30	5%	1/6W
R685	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R686	RD14BB2C111J	RES. CARBON	110	5%	1/6W
R687	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R688	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R689	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R690	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R691	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R701	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R702	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R703	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R704	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R705	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R706	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R707	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R708	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R709	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R710	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R711	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R712	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R713	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R714	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R801	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R802	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R803	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R811	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R812	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R821	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R822	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R901	RD14BB2C560J	RES. CARBON	56	5%	1/6W
R902	RD14BB2C560J	RES. CARBON	56	5%	1/6W
TC101	C05-0469-05	CAP. TRIMMER	10P		
TC201	C05-0469-05	CAP. TRIMMER	10P		
TC501	C05-0469-05	CAP. TRIMMER	10P		
TC502	C05-0469-05	CAP. TRIMMER	10P		
TC503	C05-0469-05	CAP. TRIMMER	10P		
TC504	C05-0469-05	CAP. TRIMMER	10P		

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
TH501	SDT100	THERMISTOR
U1	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U2	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U3	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U4	HD74LS42P	IC,BCD TO DECIMAL DECODER
U5	SN74ALS00AN	IC,QUAD 2 INPUT NAND GATE
U6	SN74ALS112AN	IC, DUAL J-K F.F.(WITH PR&CLR)
U7	SN74ALS00AN	IC,QUAD 2 INPUT NAND GATE
U8	SN74ALS112AN	IC, DUAL J-K F.F.(WITH PR&CLR)
U9	SN74ALS00AN	IC,QUAD 2 INPUT NAND GATE
U101	NJM4558D	IC,DUAL OP AMP
U102	KMC03	IC, LINEAR
U201	NJM4558D	IC,DUAL OP AMP
U202	KMC03	IC, LINEAR
VR101	R12-0569-05	RES. SEMI FIXED 100 B
VR102	R12-0569-05	RES. SEMI FIXED 100 B
VR103	R12-2520-05	RES. SEMI FIXED 5KB
VR104	R12-3543-05	RES. SEMI FIXED 20KB
VR201	R12-0569-05	RES. SEMI FIXED 100 B
VR202	R12-0569-05	RES. SEMI FIXED 100 B
VR203	R12-2520-05	RES. SEMI FIXED 5KB
VR204	R12-3543-05	RES. SEMI FIXED 20KB
VR501	R12-0570-05	RES. SEMI FIXED 200 B
VR502	R12-1538-05	RES. SEMI FIXED 1KB
VR503	R12-3543-05	RES. SEMI FIXED 20KB
VR504	R12-0570-05	RES. SEMI FIXED 200 B
VR505	R12-1538-05	RES. SEMI FIXED 1KB
VR506	R12-3543-05	RES. SEMI FIXED 20KB
VR507	R12-0570-05	RES. SEMI FIXED 200 B
VR508	R12-1538-05	RES. SEMI FIXED 1KB
VR509	R12-3543-05	RES. SEMI FIXED 20KB
VR510	R12-0570-05	RES. SEMI FIXED 200 B
VR511	R12-1538-05	RES. SEMI FIXED 1KB
VR512	R12-3543-05	RES. SEMI FIXED 20KB
VR513	R12-3543-05	RES. SEMI FIXED 20KB
VR601	R12-3543-05	RES. SEMI FIXED 20KB
VR602	R12-3543-05	RES. SEMI FIXED 20KB
VR603	R12-3543-05	RES. SEMI FIXED 20KB
VR604	R12-3543-05	RES. SEMI FIXED 20KB

HORIZONTAL UNIT

X74-1480-02

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J61-0408-05	WIRE WRAPPING BAND			
	J73-0008-02	PCB (UNMOUNTED)			
C1	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C2	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C3	CC45CH1H030C	CAP. CERAMIC	3P	0.25P	50V
C4	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C5	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C6	CC45CH1H221J	CAP. CERAMIC	220P	5%	50V
C7	CC45FCH1H200J	CAP. CERAMIC	20P	5%	50V
C8	CF92V1H333J	CAP. PLASTIC FILM	0.033	5%	50V
C9	CF92V1H684J	CAP. PLASTIC FILM	0.68	5%	50V
C10	CF92V1H684J	CAP. PLASTIC FILM	0.68	5%	50V
C11	CE04EW1A470M	CAP. ELECTRO	47	20%	10V
C12	CC45CH1H150J	CAP. CERAMIC	15P	5%	50V
C13	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C14	CC45CH1H030C	CAP. CERAMIC	3P	0.25P	50V
C15	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C16	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C17	CC45FCH1H200J	CAP. CERAMIC	20P	5%	50V
C18	CF92V1H333J	CAP. PLASTIC FILM	0.033	5%	50V
C19	CC45CH1H221J	CAP. CERAMIC	220P	5%	50V
C20	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C21	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C22	NO USE				
C23	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C24	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C25	NO USE				
C26	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C27	CK45FF1H103Z	CAP. CERAMIC	0.01		50V

REF.NO	PARTS NO	NAME & DESCRIPTION			
C101	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C102	CK45FB1H222K	CAP. CERAMIC	2200P	10%	50V
C103	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C104	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C105	CK45FB1H222K	CAP. CERAMIC	2200P	10%	50V
C106	CK45B1H222K	CAP. CERAMIC	2200P	10%	50V
C107	CE04EW1A470M	CAP. ELECTRO	47	20%	10V
C108	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C109	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C110	CM93BD2A101J	CAP. MICA	100P	5%	100V
C111	C91-1272-05	CAP. POLYESTER	1.5	5%	100V
C112	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C113	CE04EW1A470M	CAP. ELECTRO	47	20%	10V
C114	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C115	CC45FSL1H391J	CAP. CERAMIC	390P	5%	50V
C116	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C117	CF92V1H224J	CAP. POLYESTER	0.22	5%	50V
C118	CC45CH1H330J	CAP. CERAMIC	33P	5%	50V
C119	NO USE				
C120	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C121	CC45FCH1H680J	CAP. CERAMIC	68P	5%	50V
C122	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C123	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C124	CM93BD2A101J	CAP. MICA	100P	5%	100V
C125	C91-1272-05	CAP. POLYESTER	1.5	5%	100V
C126	NO USE				
C127	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C128	CE04EW1A470M	CAP. ELECTRO	47	20%	10V
C129	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C130	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C131	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C132	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C133	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C134	CE04EW1C330M	CAP. ELECTRO	33	20%	16V
C135	CE04EW1C330M	CAP. ELECTRO	33	20%	16V
C136	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C137	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C138	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C139	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C140	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C141	CC45FCH1H200J	CAP. CERAMIC	20P	5%	50V
C145	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C302	CE04EW1A470M	CAP. ELECTRO	47	20%	10V
C303	NO USE				
C304	CC45CH1H470J	CAP. CERAMIC	47P	5%	50V
C305	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C306	C90-0987-05	CAP. ELECTRO	1000	20%	6.3V
C310	CC45CH1H070D	CAP. CERAMIC	7P	0.5P	50V
C311	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C312	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C313	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C325	CE04EW1H2R2M	CAP. ELECTRO	2.2	20%	50V
C401	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
C402	CC45FCH1H910J	CAP. CERAMIC	91P	5%	50V
C403	CC45CH1H910J	CAP. CERAMIC	91P	5%	50V
C404	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C405	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C406	CE04EW1C100M	CAP. ELECTRO	10	20%	16V
C407	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C501	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C502	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C503	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C504	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C505	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C506	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C507	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C508	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C509	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C510	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C511	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C512	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C513	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C514	NO USE				
C515	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C516	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C517	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C518	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C519	CE04EW1A101M	CAP. ELECTRO	100	20%	10V

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
C528	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C529	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C530	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C531	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C532	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C533	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C534	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C535	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C551	CE04EW1A471M	CAP. ELECTRO	470	20%	10V
C552	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C553	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C554	CE04EW1A102M	CAP. ELECTRO	1000	20%	10V
C555	CE04EW1C101M	CAP. ELECTRO	100	20%	16V
C556	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C557	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C558	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C801	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C802	CE04BW1H010M	CAP. ELECTRO	1	20%	50V
C805	CC45CH1H270J	CAP. CERAMIC	27P	5%	50V
C806	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C807	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C808	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C809	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C810	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C901	CC45CH1H470J	CAP. CERAMIC	47P	5%	50V
D2	1SS132	DIODE			
D3	MA700	DIODE			
D4	MA700	DIODE			
D5	MA700	DIODE			
D6	MA700	DIODE			
D7	MA700	DIODE			
D8	NO USE				
D9	1SS132	DIODE			
D10	MA700	DIODE			
D101	MA700	DIODE			
D102	MA700	DIODE			
D103	MA700	DIODE			
D104	MA700	DIODE			
D105	MA700	DIODE			
D106	MA700	DIODE			
D107	MA700	DIODE			
D108	MA700	DIODE			
D109	MA700	DIODE			
D110	MA700	DIODE			
D111	MA700	DIODE			
D112	1SS132	DIODE			
D113	1SS132	DIODE			
D114	NO USE				
D115	MA700	DIODE			
D116	MA700	DIODE			
D117	MA700	DIODE			
D118	1SS132	DIODE			
D119	1SS132	DIODE			
D120	1SS132	DIODE			
D121	NO USE				
D122	MA700	DIODE			
D123	MA700	DIODE			
D124	1S1587	DIODE			
D125	NO USE				
D126	1S1587	DIODE			
D127	NO USE				
D128	1SS132	DIODE			
D301	1SS132	DIODE			
D302	1SS132	DIODE			
D303	1SS132	DIODE			
D304	MA700	DIODE			
D305	1SS132	DIODE			
D306	MA700	DIODE			
D307	1SS132	DIODE			
D308	1SS132	DIODE			
D309	1SS132	DIODE			
D310	MA700	DIODE			
D311	MA700	DIODE			
D312	MA700	DIODE			
D313	MA700	DIODE			
D314	MA700	DIODE			
D315	1SS132	DIODE			
D316	1SS132	DIODE			

REF.NO	PARTS NO	NAME & DESCRIPTION		
D401	1SS132	DIODE		
D402	MA700	DIODE		
D801	1SS132	DIODE		
D802	1SS132	DIODE		
D803	1SS132	DIODE		
D804	MTZ3.3JA	DIODE, ZENER	3.27V	
D805	1SS132	DIODE		
D806	1SS132	DIODE		
D807	1SS132	DIODE		
D808	1SS132	DIODE		
D809	1SS132	DIODE		
JW1	E31-5572-05	WIRE ASS'Y		
K1	S51-1527-05	RELAY		
K2	S51-1527-05	RELAY		
L1	L40-1011-04	FERRI INDUCTOR	100UH	10%
L2	L40-2201-03	FERRI INDUCTOR	22UH	10%
L3	L40-2201-03	FERRI INDUCTOR	22UH	10%
P18	E40-7035-05	SOCKET	40P	
P101	E40-0711-05	PIN CONNECTOR	7P	
Q1	2SC3779(D)	TR. SI, NPN		
Q2	2SC3779(D)	TR. SI, NPN		
Q3	2SA1565	TR. SI, PNP		
Q4	2SK304(F)	FET, N-CHANNEL		
Q5	2SA1206	TR. SI, PNP		
Q6	2SC3779(D)	TR. SI, NPN		
Q7	2SA1206	TR. SI, PNP		
Q8	2SC2785(F)	TR. SI, NPN		
Q9	2SA1565	TR. SI, PNP		
Q10	2SK304(F)	FET, N-CHANNEL		
Q14	2SC3779(D)	TR. SI, NPN		
Q15	2SC3779(D)	TR. SI, NPN		
Q16	2SA1565	TR. SI, PNP		
Q17	2SA1206	TR. SI, PNP		
Q18	2SC3779(D)	TR. SI, NPN		
Q19	2SA1206	TR. SI, PNP		
Q20	2SC2785(F)	TR. SI, NPN		
Q101	2SC4049	TR. SI, NPN		
Q102	NO USE			
Q103	2SA1206	TR. SI, PNP		
Q104	2SC2785(F)	TR. SI, NPN		
Q105	2SC4049	TR. SI, NPN		
Q106	2SC4049	TR. SI, NPN		
Q107	2SC4049	TR. SI, NPN		
Q108	NO USE			
Q109	2SA1005(K)	TR. SI, PNP		
Q110	2SA1174(E,F)	TR. SI, PNP		
Q111	2SC3732(L)	TR. SI, NPN		
Q112	2SC3732(L)	TR. SI, NPN		
Q113	2SA1175(F)	TR. SI, PNP		
Q114	2SC3315(C)	TR. SI, NPN		
Q115	2SA1175(F)	TR. SI, PNP		
Q116	2SC3354(T,S)	TR. SI, NPN		
Q117	2SC3315(C)	TR. SI, NPN		
Q118	2SC2785(F)	TR. SI, NPN		
Q119	2SA1175(F)	TR. SI, PNP		
Q120	2SC2785(F)	TR. SI, NPN		
Q121	2SC3732(L)	TR. SI, NPN		
Q122	2SA1206	TR. SI, PNP		
Q123	2SC3315(C)	TR. SI, NPN		
Q124	2SA1206	TR. SI, PNP		
Q125	2SA1565	TR. SI, PNP		
Q126	2SA1206	TR. SI, PNP		
Q127	2SA1206	TR. SI, PNP		
Q128	2SA1005(K)	TR. SI, PNP		
Q129	2SA1174(E,F)	TR. SI, PNP		
Q130	2SC3732(L)	TR. SI, NPN		
Q131	2SC3732(L)	TR. SI, NPN		
Q132	2SA1175(F)	TR. SI, PNP		
Q133	2SC3315(C)	TR. SI, NPN		
Q134	2SC3354(T,S)	TR. SI, NPN		
Q135	2SC3315(C)	TR. SI, NPN		
Q136	2SC3732(L)	TR. SI, NPN		
Q137	2SC3732(L)	TR. SI, NPN		

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
Q301	2SA1175(F)	TR. SI, PNP			
Q302	2SC2785(F)	TR. SI, NPN			
Q303	2SC3315(C)	TR. SI, NPN			
Q304	2SC3315(C)	TR. SI, NPN			
Q305	2SC3315(C)	TR. SI, NPN			
Q306	2SC3315(C)	TR. SI, NPN			
Q307	2SC3315(C)	TR. SI, NPN			
Q308	2SC3315(C)	TR. SI, NPN			
Q309	2SC3315(C)	TR. SI, NPN			
Q310	2SA1565	TR. SI, PNP			
Q311	2SC3354(T,S)	TR. SI, NPN			
Q314	2SC3354(T,S)	TR. SI, NPN			
Q401	2SK583	FET, N-CHANNEL			
Q402	2SA1175(F)	TR. SI, PNP			
Q403	2SA1005(K)	TR. SI, PNP			
Q404	2SA1005(K)	TR. SI, PNP			
Q405	2SA1175(F)	TR. SI, PNP			
Q406	2SC2785(F)	TR. SI, NPN			
Q801	2SC2785(F)	TR. SI, NPN			
R1	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R2	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
R3	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R4	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R5	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R6	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R7	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R8	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R9	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R10	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R11	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R12	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R13	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R14	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R15	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R16	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R17	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R18	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R19	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R20	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R21	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R22	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R23	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R24	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R25	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R26	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R27	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R28	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R29	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R33	RD14BB2C754J	RES. CARBON	750K	5%	1/6W
R34	RD14BB2C754J	RES. CARBON	750K	5%	1/6W
R35	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R36	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R37	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R38	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R39	RN14BK2C5100F	RES. METAL FILM	510	1%	1/6W
R40	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R41	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R42	RN14BK2C5100F	RES. METAL FILM	510	1%	1/6W
R43	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R44	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R45	NO USE				
R46	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R51	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R52	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R53	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R54	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R55	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R56	NO USE				
R57	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R58	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R59	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R60	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R61	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R62	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R63	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R64	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R65	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R66	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R67	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R68	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R69	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R70	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R71	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R72	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R73	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R74	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R77	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R78	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R79	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R80	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R81	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R82	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R83	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R101	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R102	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R103	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R104	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R105	R90-0659-05	RES. NETWORK	4X510	5%	1/8W
R106	NO USE				
R107	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R108	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R109	R90-0660-05	RES. NETWORK	4X1K	5%	1/8W
R110	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R111	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R112	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R113	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R114	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R115	R90-0659-05	RES. NETWORK	4X510	5%	1/8W
R116	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R117	R90-0660-05	RES. NETWORK	4X1K	5%	1/8W
R118	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R119	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R120	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R121	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R122	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R123	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R124	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R125	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R126	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R127	R90-0658-05	RES. NETWORK			
R128	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R129	NO USE				
R130	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R131	NO USE				
R132	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R133	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R134	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R135	RD14BB2C241J	RES. CARBON	240	5%	1/6W
R136	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R137	RD14BB2C362J	RES. CARBON	3.6K	5%	1/6W
R138	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R139	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R140	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R141	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R142	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R143	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R144	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R145	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R146	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R147	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R148	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R149	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R150	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R151	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R152	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R153	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R154	RN14BK2C1152F	RES. METAL FILM	11.5K	1%	1/6W
R155	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R156	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R157	RD14BB2C563J	RES. CARBON	56K	5%	1/6W
R158	RN14BK2C9101F	RES. METAL FILM	9.1K	1%	1/6W
R159	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R160	RN14BK2C5601F	RES. METAL FILM	5.6K	1%	1/6W
R161	RN14BK2C9101F	RES. METAL FILM	9.1K	1%	1/6W
R162	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R163	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R164	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R165	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R166	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R167	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R168	RD14BB2C681J	RES. CARBON	680	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R169	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R170	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R171	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R172	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R173	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R174	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R175	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R176	RD14BB2C224J	RES. CARBON	220K	5%	1/6W
R177	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R178	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R179	RD14BB2C752J	RES. CARBON	7.5K	5%	1/6W
R180	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R181	RN14BK2C1102F	RES. METAL FILM	11K	1%	1/6W
R182	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R183	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R184	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R185	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R186	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R187	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R188	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R189	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R190	RN14BK2C2701F	RES. METAL FILM	2.7K	1%	1/6W
R191	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R192	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R193	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R194	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R195	R90-0658-05	RES. NETWORK			
R196	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R197	RN14BK2C8201F	RES. METAL FILM	8.2K	1%	1/6W
R198	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R199	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R200	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R201	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R202	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R203	RD14BB2C241J	RES. CARBON	240	5%	1/6W
R204	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R205	RD14BB2C362J	RES. CARBON	3.6K	5%	1/6W
R206	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R207	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R208	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R209	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R210	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R211	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R212	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R213	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R214	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R215	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R216	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R217	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R218	RN14BK2C1302F	RES. METAL FILM	13K	1%	1/6W
R219	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R220	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R221	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R222	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R223	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R224	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R225	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R226	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R227	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R228	NO USE				
R229	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R301	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R302	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R305	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R306	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R307	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R308	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R309	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R310	NO USE				
R311	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R312	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R313	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R314	RD14BB2C203J	RES. CARBON	20K	5%	1/6W
R315	RD14BB2C273J	RES. CARBON	27K	5%	1/6W
R316	RD14BB2C273J	RES. CARBON	27K	5%	1/6W
R317	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R318	RN14BK2C1961F	RES. METAL FILM	1.96K	1%	1/6W
R319	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R320	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R321	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R322	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R323	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R324	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R325	RD14BB2C164J	RES. CARBON	160K	5%	1/6W
R326	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R327	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R328	RD14BB2C131J	RES. CARBON	130	5%	1/6W
R329	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R330	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R331	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R332	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R333	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R334	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R335	RN14BK2C5602F	RES. METAL FILM	56K	1%	1/6W
R336	RN14BK2C1502F	RES. METAL FILM	15K	1%	1/6W
R337	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R338	NO USE				
R339	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R340	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R341	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R342	R90-0660-05	RES. NETWORK	4X1K	5%	1/8W
R343	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R344	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R345	RN14BK2C5601F	RES. METAL FILM	5.6K	1%	1/6W
R346	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R347	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R348	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R349	RN14BK2C2001F	RES. METAL FILM	2K	1%	1/6W
R350	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R351	RN14BK2C2702F	RES. METAL FILM	27K	1%	1/6W
R352	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R353	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R354	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R355	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R356	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R357	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R358	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R359	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R360	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R361	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R362	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R363	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R364	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R365	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R366	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R367	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R368	RN14BK2C1602F	RES. METAL FILM	16K	1%	1/6W
R369	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R370	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R371	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R372	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R373	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R374	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R401	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R402	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R403	NO USE				
R404	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R405	RD14BB2C752J	RES. CARBON	7.5K	5%	1/6W
R406	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R407	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R408	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R409	RD14BB2C273J	RES. CARBON	27K	5%	1/6W
R410	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R411	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R412	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R413	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R414	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R415	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R416	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R417	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R418	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R419	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R420	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R421	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R422	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R423	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R801	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R802	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R803	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R806	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
R807	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R808	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R809	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R810	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R811	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R812	RD14BB2C511J	RES. CARBON	510	5%	1/6W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R813	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R814	NO USE				
R815	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R816	RN14BK2C75R0F	RES. METAL FILM	75.0	1%	1/6W
R817	RD14BB2C910J	RES. CARBON	91	5%	1/6W
R901	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
TC101	C05-0446-05	CAP. TRIMMER	30P		
TC102	C05-0446-05	CAP. TRIMMER	30P		
TC302	C05-0468-05	CAP. TRIMMER	7P		
TC303	C05-0468-05	CAP. TRIMMER	7P		
TH1	SDT-20	THERMISTOR			
U1	MC10H102L	IC, QUAD 2-INPUT NOR GATE			
U2	MC10H102L	IC, QUAD 2-INPUT NOR GATE			
U3	MC10H131L	IC,DUAL D-FILP FLOP			
U4	MC10103L	IC, QUAD 2-INPUT OR GATE			
U5	SN74ALS74AN	IC,DUAL D-F.F. (WITH PR&CLR)			
U6	SN74ALS74AN	IC,DUAL D-F.F. (WITH PR&CLR)			
U7	SN74ALS74AN	IC,DUAL D-F.F. (WITH PR&CLR)			
U8	SN74ALS191N	IC,SYNC. U/D 4-BIT BINARY COUN			
U9	SN74ALS191N	IC,SYNC. U/D 4-BIT BINARY COUN			
U10	SN74ALS191N	IC,SYNC. U/D 4-BIT BINARY COUN			
U11	SN74ALS02N	IC,QUAD 2 INPUT NOR			
U12	SN74ALS32N	IC,QUAD 2 INPUT OR			
U13	SN74ALS08N	IC,QUAD 2 INPUT AND			
U14	SN74ALS32N	IC,QUAD 2 INPUT OR			
U15	SN74ALS02N	IC,QUAD 2 INPUT NOR			
U16	MC14052BCP	IC,DUAL 4-CH ANALOG MPX/DE-MPX			
U17	MC14052BCP	IC,DUAL 4-CH ANALOG MPX/DE-MPX			
U18	MC14052BCP	IC,DUAL 4-CH ANALOG MPX/DE-MPX			
U19	MC74HC4053AN	IC,TRIPLE 2CH ANALOG MPX/DE-MP			
U20	NO USE				
U21	NJM072S	IC,J-FET INPUT OP AMP			
U22	NJM072S	IC,J-FET INPUT OP AMP			
U23	NO USE				
U24	NJM072S	IC,J-FET INPUT OP AMP			
U25	NJM072S	IC,J-FET INPUT OP AMP			
U26	NJM072S	IC,J-FET INPUT OP AMP			
U27	NJM072S	IC,J-FET INPUT OP AMP			
U28	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U29	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U30	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U31	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U32	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U101	2SK332(E)	FET, N-CHANNEL			
U102	2SC3066(F)	TR. DUAL, SI, NPN			
U103	2SK332(E)	FET, N-CHANNEL			
VR1	R12-3543-05	RES. SEMI FIXED 20KB			
VR2	NO USE				
VR3	R12-0571-05	RES. SEMI FIXED 500 B			
VR4	R12-3543-05	RES. SEMI FIXED 20KB			
VR101	R12-1538-05	RES. SEMI FIXED 1KB			
VR102	R12-2520-05	RES. SEMI FIXED 5KB			
VR103	NO USE				
VR104	R12-3543-05	RES. SEMI FIXED 20KB			
VR301	R12-1539-05	RES. SEMI FIXED 2KB			
VR302	R12-1539-05	RES. SEMI FIXED 2KB			
VR303	R12-0571-05	RES. SEMI FIXED 500 B			
VR304	R12-3453-05	RES. SEMI FIXED 10KB			
VR305	R12-3453-05	RES. SEMI FIXED 10KB			
VR306	R12-3453-05	RES. SEMI FIXED 10KB			
VR307	R12-0569-05	RES. SEMI FIXED 100 B			

ATT UNIT

X75-1180-01

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E04-0260-05	BNC RECEPTACLE (READOUT)			
	J21-4612-14	BRACKET,FOR BNC			
	J25-5230-13	PCB (UNMOUNTED)			
	J30-0623-04	SPACER			
	N35-3006-41	SCREW, BINDING	M3X6		
C1	CE04EW1C471M	CAP. ELECTRO	470	20%	16V
C2	CE04EW1C471M	CAP. ELECTRO	470	20%	16V
C3	CE04EW1A221M	CAP. ELECTRO	220	20%	10V
C4	CE04EW1A221M	CAP. ELECTRO	220	20%	10V
C5	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C6	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C7	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C8	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C9	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C10	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C11	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C12	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C13	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C14	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C15	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C16	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C17	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C18	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C19	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C20	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C101	C91-0502-05	CAP. POLYESTER	0.01	20%	630V
C102	NO USE				
C103	CE04EW1C330M	CAP. ELECTRO	33	20%	16V
C104	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C105	NO USE				
C106	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C107	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C201	C91-0502-05	CAP. POLYESTER	0.01	20%	630V
C202	NO USE				
C203	CE04EW1C330M	CAP. ELECTRO	33	20%	16V
C204	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C205	NO USE				
C206	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C207	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C301	CC45CH2H050C	CAP. CERAMIC	5P	0.25P	500V
C302	C91-0502-05	CAP. POLYESTER	0.01	20%	630V
C303	NO USE				
C304	CC45FCH1H030C	CAP. CERAMIC	3P	0.25P	50V
C305	CC45CH2H080D	CAP. CERAMIC	8P	0.5P	500V
C306	NO USE				
C307	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C350	CC45CH1H180J	CAP. CERAMIC	18P	5%	50V
C351	CC45CH1H220J	CAP. CERAMIC	22P	5%	50V
C401	CC45CH2H050C	CAP. CERAMIC	5P	0.25P	500V
C402	C91-0502-05	CAP. POLYESTER	0.01	20%	630V
C403	NO USE				
C404	CC45FCH1H030C	CAP. CERAMIC	3P	0.25P	50V
C405	CC45CH2H080D	CAP. CERAMIC	8P	0.5P	500V
C406	NO USE				
C407	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C450	CC45CH1H180J	CAP. CERAMIC	18P	5%	50V
C451	CC45CH1H220J	CAP. CERAMIC	22P	5%	50V
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D101	1SS132	DIODE			
D102	1SS132	DIODE			
D201	1SS132	DIODE			
D202	1SS132	DIODE			
D301	1SS132	DIODE			
D302	1SS132	DIODE			
D303	1SS135	DIODE			
D401	1SS132	DIODE			
D402	1SS132	DIODE			
D403	1SS135	DIODE			

REF.NO	PARTS NO	NAME & DESCRIPTION			
JW5	E38-0084-05	WIRE ASS'Y			
JW6	E38-0085-05	WIRE ASS'Y			
K301	S51-2508-05	RELAY			
K401	S51-2508-05	RELAY			
L1	L40-1011-03	FERRI INDUCTOR	100UH	10%	
P4	E40-5066-05	PIN CONNECTOR	9P		
P7	E40-3239-05	PIN CONNECTOR	4P		
P8	E40-3239-05	PIN CONNECTOR	4P		
P9	E40-3238-05	PIN CONNECTOR	3P		
Q1	2SA1565	TR. SI, PNP			
Q2	2SA1565	TR. SI, PNP			
Q101	2SC3354(T,S)	TR. SI, NPN			
Q102	2SC3354(T,S)	TR. SI, NPN			
Q201	2SC3354(T,S)	TR. SI, NPN			
Q202	2SC3354(T,S)	TR. SI, NPN			
Q301	2SK241(GR)	FET, N-CHANNEL			
Q302	2SK241(GR)	FET, N-CHANNEL			
Q303	2SC3354(T,S)	TR. SI, NPN			
Q304	2SC3779(D)	TR. SI, NPN			
Q305	2SC3779(D)	TR. SI, NPN			
Q306	2SC3354(T,S)	TR. SI, NPN			
Q401	2SK241(GR)	FET, N-CHANNEL			
Q402	2SK241(GR)	FET, N-CHANNEL			
Q403	2SC3354(T,S)	TR. SI, NPN			
Q404	2SC3779(D)	TR. SI, NPN			
Q405	2SC3779(D)	TR. SI, NPN			
Q406	2SC3354(T,S)	TR. SI, NPN			
R1	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R2	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R3	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R4	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R5	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R6	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R7	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R8	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R9	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R101	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
R102	RD14BB2C824J	RES. CARBON	820K	5%	1/6W
R103	RN14BK2C62R0F	RES. METAL FILM	62.0	1%	1/6W
R104	RN14BK2C62R0F	RES. METAL FILM	62.0	1%	1/6W
R105	R92-1431-15	RES. TEMP. COEFF:	330	5%	1/6W
R106	RN14BK2C5100F	RES. METAL FILM	510	1%	1/6W
R107	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R108	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R109	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R110	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R111	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R112	NO USE				
R113	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R114	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R115	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R116	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R117	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
R118	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R119	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
R120	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R121	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R122	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R123	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R124	NO USE				
R125	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R126	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R127	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R128	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R150	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R201	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
R202	RD14BB2C824J	RES. CARBON	820K	5%	1/6W
R203	RN14BK2C62R0F	RES. METAL FILM	62.0	1%	1/6W
R204	RN14BK2C62R0F	RES. METAL FILM	62.0	1%	1/6W
R205	R92-1431-15	RES. TEMP. COEFF:	330	5%	1/6W
R206	RN14BK2C5100F	RES. METAL FILM	510	1%	1/6W
R207	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R208	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R209	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R210	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R211	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R212	NO USE				
R213	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R214	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R215	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R216	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R217	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
R218	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R219	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
R220	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R221	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R222	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R223	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R224	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R225	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R226	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R227	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R228	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R250	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R301	RD14BB2E330J	RES. CARBON	33	5%	1/4W
R302	RD14BB2C560J	RES. CARBON	56	5%	1/6W
R303	R92-1433-05	RES. METAL FILM	800K	0.5%	1/2W
R304	R92-1432-05	RES. METAL FILM	250K	0.5%	1/2W
R305	RD14BB2C240J	RES. CARBON	24	5%	1/6W
R306	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
R307	RD14BB2C684J	RES. CARBON	680K	5%	1/6W
R308	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R309	RD14BB2C201J	RES. CARBON	200	5%	1/6W
R310	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R311	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R312	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R313	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R314	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R315	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R316	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R317	NO USE				
R318	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R319	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R320	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R350	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R401	RD14BB2E330J	RES. CARBON	33	5%	1/4W
R402	RD14BB2C560J	RES. CARBON	56	5%	1/6W
R403	R92-1433-05	RES. METAL FILM	800K	0.5%	1/2W
R404	R92-1432-05	RES. METAL FILM	250K	0.5%	1/2W
R405	RD14BB2C240J	RES. CARBON	24	5%	1/6W
R406	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
R407	RD14BB2C684J	RES. CARBON	680K	5%	1/6W
R408	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R409	RD14BB2C201J	RES. CARBON	200	5%	1/6W
R410	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R411	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R412	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R413	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R414	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R415	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R416	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R417	NO USE				
R418	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R419	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R420	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R450	RD14BB2C221J	RES. CARBON	220	5%	1/6W
S101	S02-4511-15	ATTENUATOR UNIT			
S201	S02-4511-15	ATTENUATOR UNIT			
TC101	C05-0459-05	CAP. TRIMMER	10P		
TC201	C05-0459-05	CAP. TRIMMER	10P		
TC301	C05-0031-15	CAP. TRIMMER	10P		
TC302	C05-0031-15	CAP. TRIMMER	10P		
TC401	C05-0031-15	CAP. TRIMMER	10P		
TC402	C05-0031-15	CAP. TRIMMER	10P		
U1	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U2	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH			
U101	DN1901	FET, DUAL, N-CHANNEL			
U102	UPA101G	IC, NPN TRANSISTOR ARRAY			
U201	DN1901	FET, DUAL, N-CHANNEL			
U202	UPA101G	IC, NPN TRANSISTOR ARRAY			
VR101	R12-3543-05	RES. SEMI FIXED 20KB			
VR201	R12-3543-05	RES. SEMI FIXED 20KB			

LINE COUNTER UNIT

X76-1400-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J73-0015-13	PCB (UNMOUNTED)			
C1	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C2	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C3	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C4	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C5	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C6	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C7	CC45FCH1H100D	CAP. CERAMIC	10P	0.5P	50V
C8	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C9	CE04BW1E220M	CAP. ELECTRO	22	20%	25V
C10	CE04BW1E220M	CAP. ELECTRO	22	20%	25V
C11	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C12	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C13	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C14	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C15	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C16	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C17	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C18	CQ92FM1H682K	CAP. MYLAR	6800P	10%	50V
C19	CQ92FM1H154K	CAP. MYLAR	0.15	10%	50V
C20	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C21	CE04EW1H010M	CAP. ELECTRO	1	20%	50V
C22	CQ92FM1H102K	CAP. MYLAR	1000P	10%	50V
C23	CE04EW1H010M	CAP. ELECTRO	1	20%	50V
C24	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C25	CE04EW1H010M	CAP. ELECTRO	1	20%	50V
C26	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C27	NO USE				
C28	CC45FSL1H221J	CAP. CERAMIC	220P	5%	50V
C29	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C101	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C801	CC45SL1H221J	CAP. CERAMIC	220P	5%	50V
D1	MA700	DIODE			
D2	MTZ3.0JA	DIODE, ZENER	2.96V		
D3	MTZ3.0JA	DIODE, ZENER	2.96V		
D4	1SS132	DIODE			
D5	1SS132	DIODE			
D6	1SS132	DIODE			
D7	1SS132	DIODE			
D8	1SS132	DIODE			
D9	1SS132	DIODE			
D10	MA700	DIODE			
D11	1SS132	DIODE			
P34	E40-7121-05	PIN CONNECTOR	10P		
P35	E40-3242-05	PIN CONNECTOR	7P		
P36	E40-3238-05	PIN CONNECTOR	3P		
P37	E40-3237-05	PIN CONNECTOR	2P		
P38	E40-3238-05	PIN CONNECTOR	3P		
P101	E40-0718-05	PIN CONNECTOR	7P		
Q1	2SK241(GR)	FET, N-CHANNEL			
Q2	2SK304(F)	FET, N-CHANNEL			
Q3	2SC2785(F)	TR. SI, NPN			
Q4	2SA1175(F)	TR. SI, PNP			
Q5	2SC2785(F)	TR. SI, NPN			
R1	RD14BB2C752J	RES. CARBON	7.5K	5%	1/6W
R2	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R3	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R4	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R5	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R6	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R7	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R8	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R9	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R10	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R11	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R12	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R13	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R14	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R15	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R16	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R17	RD14BB2C684J	RES. CARBON	680K	5%	1/6W
R18	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R19	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R20	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R21	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R22	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R23	RD14BB2C274J	RES. CARBON	270K	5%	1/6W
R24	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R25	RD14BB2C334J	RES. CARBON	330K	5%	1/6W
R26	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R27	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R28	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
R29	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R30	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R31	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R32	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R33	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R101	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R102	RN14BK2C1802F	RES. METAL FILM	18K	1%	1/6W
R103	RN14BK2C3002F	RES. METAL FILM	30K	1%	1/6W
R104	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R801	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R802	RD14BB2C101J	RES. CARBON	100	5%	1/6W
U1	NJM072M	IC,DUAL J-FET INPUT OP-AMP			
U2	UA733CNS	IC,VIDEO AMP			
U3	LM1881M	IC,VIDEO SYNC SEPARATOR			
U4	HD74HC221FP	IC,DUAL MONO. MULTIVIB.			
U5	HD74HC123AFP	IC,DUAL RETRIGG. SINGLE SHOT			
U6	MC74HC58F	IC,2 INPUT/3 INPUT AND-OR GATE			
U7	HD74HC00FP	IC,QUAD 2 INPUT NAND GATE			
U8	HD74HC595FP	IC,8-BIT SHIFT REGISTER/LATCH			
U9	HD74HC123AFP	IC,DUAL RETRIGG. SINGLE SHOT			
U10	HD74HC10FP	IC,TRIPLE 3 INPUT NAND GATE			
U101	HD14052BFP	IC,DUAL 4-CH ANALOG MPX/DE-MPX			

R/O UNIT

X77-1490-01

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E38-0206-05	LEAD WIRE WITH CONNECTOR			
	J73-0009-12	PCB (UNMOUNTED)			
B1	W09-0408-05	BATTERY,CR2354-1HF			
C1	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C2	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C3	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C4	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C5	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C6	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C7	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C8	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C9	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C10	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C11	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C12	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C13	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C14	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C15	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C16	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C17	CC45FCH1H220J	CAP. CERAMIC	22P	5%	50V

REF.NO	PARTS NO	NAME & DESCRIPTION			
C18	CC45FCH1H220J	CAP. CERAMIC	22P	5%	50V
C19	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C20	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C21	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C22	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C23	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C24	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C25	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C26	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C27	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C28	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C29	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C30	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C31	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C32	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C33	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C34	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C35	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C36	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C37	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C38	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C39	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C40	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C41	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C42	CC45FSL1H471J	CAP. CERAMIC	470P	5%	50V
C43	CE04EW1A471M	CAP. ELECTRO	470	20%	10V
C44	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C45	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C48	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C49	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C50	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C51	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C52	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C53	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C54	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C55	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C56	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C57	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C58	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C59	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C60	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C61	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C62	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C63	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C64	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C65	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C66	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C67	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C68	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C69	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C70	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C71	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C72	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C73	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C74	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C75	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C76	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C77	CE04EW1C471M	CAP. ELECTRO	470	20%	16V
C78	CE04EW1C471M	CAP. ELECTRO	470	20%	16V
C79	C91-1273-05	CAP. NETWORK	6X0.01		50V
C80	CE04EW1A102M	CAP. ELECTRO	1000	20%	10V
C81	NO USE				
C82	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C86	C91-0769-05	CAP. CERAMIC	0.01	20%	16V
C87	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C88	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C89	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C90	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C91	CC45FSL1H471J	CAP. CERAMIC	470P	5%	50V
C92	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C901	C91-0745-05	CAP. CERAMIC	100P	10%	50V
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D3	1SS132	DIODE			
D4	1SS132	DIODE			
D5	MTZ12JC	DIODE, ZENER	12.05V		
D6	1SS132	DIODE			
D7	1SS132	DIODE			
L1	L40-1011-03	FERRI INDUCTOR	100UH	10%	
L2	L40-1021-03	FERRI INDUCTOR	1MH	10%	
L3	L40-1092-03	FERRI INDUCTOR	1UH	20%	
L4	L40-1011-03	FERRI INDUCTOR	100UH	10%	
P1	E40-7036-05	PIN CONNECTOR	20P		
P2	E40-7037-05	PIN CONNECTOR	26P		
P3	E40-7035-05	SOCKET	40P		
P4	E40-5066-05	PIN CONNECTOR	9P		
Q1	2SA1175(F)	TR. SI, PNP			
Q2	2SC1384(R,S)	TR. SI, NPN			
R1	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R2	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R3	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R4	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R5	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R6	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R7	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R8	NO USE				
R9	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R10	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R11	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R12	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R13	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R14	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R15	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R16	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R17	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R18	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R19	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R20	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R21	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R22	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R23	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R24	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R25	RN14BK2C9100F	RES. METAL FILM	910	1%	1/6W
R26	RN14BK2C3302F	RES. METAL FILM	33K	1%	1/6W
R27	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R28	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R29	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R30	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R31	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R32	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R33	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R34	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R35	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R36	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R37	RN14BK2C2400F	RES. METAL FILM	240	1%	1/6W
R38	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R39	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R40	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R41	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R42	RN14BK2C2400F	RES. METAL FILM	240	1%	1/6W
R43	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R44	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R45	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R46	NO USE				
R47	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R48	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R49	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R50	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R51	RD14BB2C134J	RES. CARBON	130K	5%	1/6W
R52	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R53	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R54	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R55	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R58	R90-0662-05	RES. NETWORK			
R59	R90-0661-05	RES. NETWORK	4X100K		
R60	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R61	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R62	R90-0663-05	RES. NETWORK	8X1M		
R63	NO USE				
R64	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R65	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R66	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R67	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R68	NO USE				
R69	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R70	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R71	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R72	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R73	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R74	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R75	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R76	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R77	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R78	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R79	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R80	NO USE				
R81	RN14BK2C2001F	RES. METAL FILM	2K	1%	1/6W
R82	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R83	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R84	NO USE				
R85	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R86	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R87	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R88	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R89	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R90	R90-0286-05	RES. NETWORK	4X4.7K		
R91	R90-0415-05	RES. NETWORK	3X4.7K		
R92	R90-0286-05	RES. NETWORK	4X4.7K		
R256	R92-1061-05	JUMPING RES.	ZERO OHM (5MM)		
U1	MB8464A-15LL	IC,64K-BIT SRAM			
U2	MBM27C256*T	IC,256K-BIT EPROM			
U3	MSM6242BGS-VK	IC,REAL TIME CLOCK			
U4	PST518B	IC,RESET			
U5	LH0080A	IC,CPU			
U6	DTM-5010	IC, GATE ARRAY			
U7	HD74LS138FP	IC,3-TO-8 DEMULTIPLEXER			
U8	HD74HC238FP	IC,3-TO-8 LINE DECODER			
U9	HD74HC238FP	IC,3-TO-8 LINE DECODER			
U10	HD74HC107FP	IC,DUAL J-K FLIP-FLOP			
U11	HD74LS04FP	IC,HEX INVERTERS			
U12	HD74LS244FP	IC,OCTAL 3-STATE BUS BUFFER			
U13	HD74LS244FP	IC,OCTAL 3-STATE BUS BUFFER			
U14	HD74LS04FP	IC,HEX INVERTERS			
U15	HD74LS30FP	IC,8-INPUT NAND			
U16	HD74LS374FP	IC,OCTAL 3-STATE D-FF			
U17	HD74LS244FP	IC,OCTAL 3-STATE BUS BUFFER			
U18	HD74LS244FP	IC,OCTAL 3-STATE BUS BUFFER			
U19	HD14066BFP	IC,QUAD BILATERAL SWITCH			
U20	HD74LS107AFP	IC,QUAD JK-FF WITH CLEAR			
U21	HD74LS107AFP	IC,QUAD JK-FF WITH CLEAR			
U22	HD74LS107AFP	IC,QUAD JK-FF WITH CLEAR			
U23	HD74LS107AFP	IC,QUAD JK-FF WITH CLEAR			
U24	HD74LS30FP	IC,8-INPUT NAND			
U25	HD74LS11FP	IC,TRIPLE 3-INPUT AND			
U26	NJM555M	IC,TIMER			
U27	HD74LS157FP	IC,2 TO 1 DATA SELECTORS			
U28	HD74LS157FP	IC,2 TO 1 DATA SELECTORS			
U29	HD74HC08FP	IC,QUAD 2-INPUT AND GATE			
U30	HD74HC7266FP	IC,QUAD 2-INPUT NOR GATE			
U31	HD74HC08FP	IC,QUAD 2-INPUT AND GATE			
U32	MBM27C64*V	IC,64K-BIT EPROM			
U33	CTM5020	IC,GATE ARRAY OP			0V
U34	HD14051BFP	IC,8-CH ANALOG MPX/DE-MPX			
U35	NJM311M	IC,VOLTAGE COMPARATOR			
U36	HD74HC174FP	IC,HEX D-TYPE FLIP-FLOP			
U37	AM6012DC	IC,12-BIT D/A CONVERTER			
U38	HD74HC564FP	IC,OCTAL D-TYPE FLIP-FLOP			
U39	HD74HC244FP	IC,OCTAL BUS BUFFER			
U40	HD14052BFP	IC,DUAL 4-CH ANALOG MPX/DE-MPX			
U41	HD14051BFP	IC,8-CH ANALOG MPX/DE-MPX			
U42	DAC0808LCN	IC,8-BIT D/A CONVERTER			
U43	HD14052BFP	IC,DUAL 4-CH ANALOG MPX/DE-MPX			
U44	NJM072M	IC,DUAL J-FET INPUT OP-AMP			
U45	NJM072M	IC,DUAL J-FET INPUT OP-AMP			
U46	NJM072M	IC,DUAL J-FET INPUT OP-AMP			
U47	NJM072M	IC,DUAL J-FET INPUT OP-AMP			
X1	L78-0107-05	CERAMIC RESONATOR (10MHZ)			
X2	L77-1229-05	CRYSTAL RESONATOR			

CONNECTION UNIT

X77-1500-01

REF.NO	PARTS NO	NAME & DESCRIPTION	
	J73-0012-03	PCB (UNMOUNTED)	
P3	E40-7034-05	PIN CONNECTOR	40P
P10	E40-7036-05	PIN CONNECTOR	20P
P11	NO USE		
P12	E38-0072-05	LEAD WIRE WITH CONNECTOR	10P
P13	E38-0071-05	LEAD WIRE WITH CONNECTOR	6P
P17	E38-0073-05	LEAD WIRE WITH CONNECTOR	11P
P18	E40-7034-05	PIN CONNECTOR	40P
P19	E38-0074-05	LEAD WIRE WITH CONNECTOR	12P
P34	E40-7122-05	PIN CONNECTOR	10P

FINAL UNIT

X80-1100-02

REF.NO	PARTS NO	NAME & DESCRIPTION			
	F01-0866-04	HEAT SINK			
	F02-0502-04	HEAT SINK			
	J25-5196-13	PCB (UNMOUNTED)			
	N09-0718-05	SCREW, SEMS PAN HD			
	N89-3008-41	SCREW, BINDING TAPTITE 3X8			
C1	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C2	C91-1275-05	CAP. ELECTRO	33000		5.5V
C3	C91-1275-05	CAP. ELECTRO	33000		5.5V
C4	CQ92FM1H472K	CAP. MYLAR	4700P	10%	50V
C5	CE04BW1H010M	CAP. ELECTRO	1	20%	50V
C6	CC45CH1H330J	CAP. CERAMIC	33P	5%	50V
C7	CC45FCH1H080D	CAP. CERAMIC	8P	0.5P	50V
C8	NO USE				
C9	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C10	CC45CH1H390J				
C11	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C12	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C13	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C14	CC45SL1H561J	CAP. CERAMIC	560P	5%	50V
C15	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C103	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C104	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C105	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C108	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C109	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
C110	CC45FCH2H0R5C	CAP. CERAMIC	0.5P	0.25P	500V
C111	CF93AN2E103K	CAP. METAL FILM	0.01	10%	250V
C112	CF93AN2E103K	CAP. METAL FILM	0.01	10%	250V
C113	CF93AN2E104K	CAP. METAL FILM	0.1	10%	250V
C114	CF93AN2E104K	CAP. METAL FILM	0.1	10%	250V
C115	CC45CH1H040C				
C116	CE04BW1E220M	CAP. ELECTRO	22	20%	25V
C301	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C302	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C303	CE04EW1E101M	CAP. ELECTRO	100	20%	25V
C304	CE04EW2A220M	CAP. ELECTRO	22	20%	100V
C305	CE04W2E4R7M	CAP. ELECTRO	4.7	20%	250V
C306	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C307	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C308	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C309	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C310	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C311	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C312	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C313	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C314	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C901	CQ92M1H102K	CAP. MYLAR	1000P	10%	50V
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D101	TLR112	LED,RED			
D102	MA700	DIODE			
D105	MA700	DIODE			

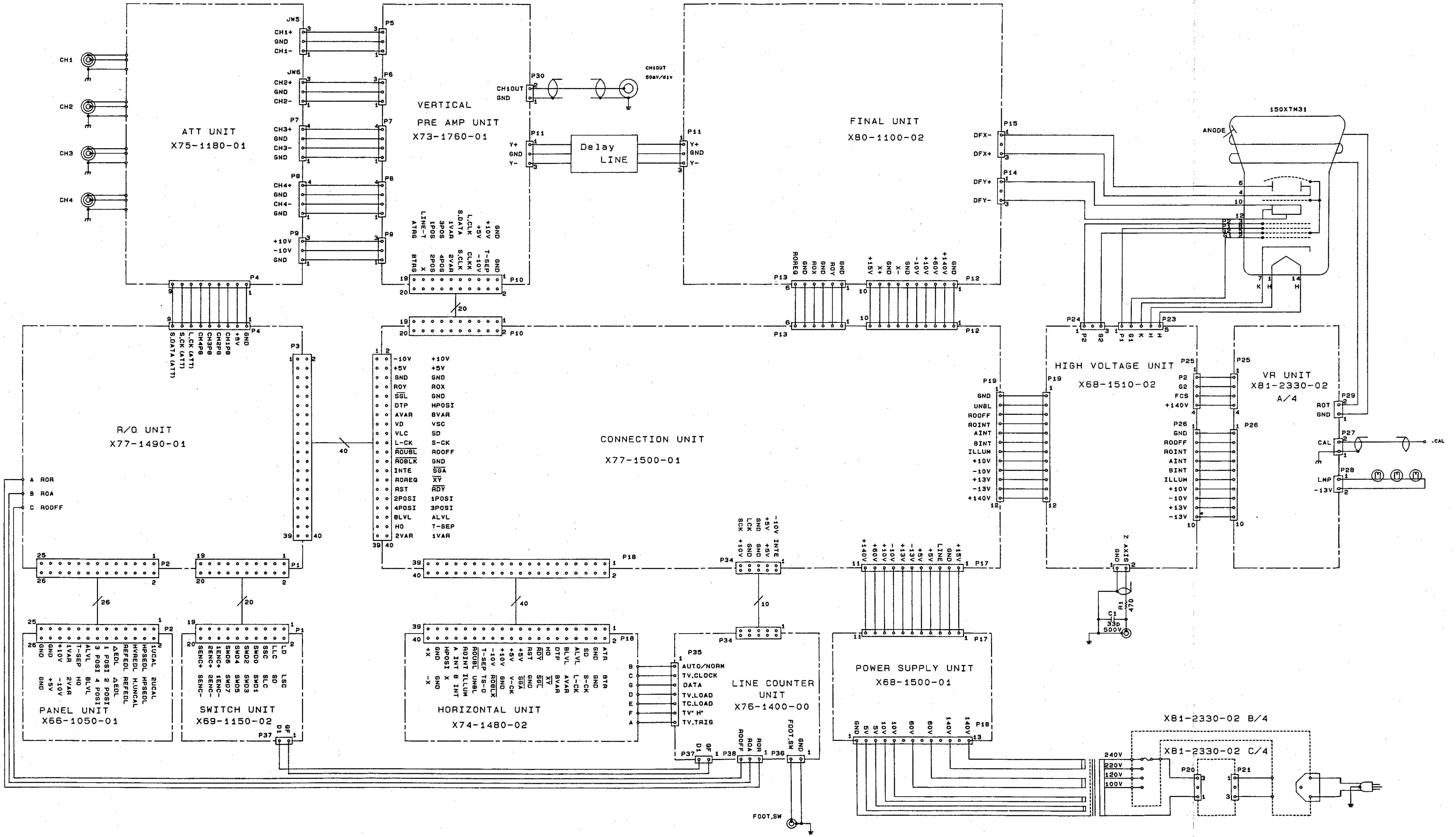
REF.NO	PARTS NO	NAME & DESCRIPTION			
D106	TLR112	LED,RED			
D107	1SS132	DIODE			
D108	1SS132	DIODE			
D201	1SS132	DIODE			
D202	1SS132	DIODE			
L1	L33-0806-05	CHOKE COIL (0.52UH)			
L2	L33-0806-05	CHOKE COIL (0.52UH)			
L3	L40-2282-70	FERRI INDUCTOR	0.22UH	20%	
L4	L40-2282-70	FERRI INDUCTOR	0.22UH	20%	
L5	L40-2202-70	FERRI INDUCTOR	22UH	20%	
P11	E40-3238-05	PIN CONNECTOR	3P		
P12	E40-5067-05	PIN CONNECTOR	10P		
P13	E40-3241-05	PIN CONNECTOR	6P		
P14	E40-3238-05	PIN CONNECTOR	3P		
P15	E40-3238-05	PIN CONNECTOR	3P		
Q1	2SC3779(D)	TR. SI, NPN			
Q2	2SC3779(D)	TR. SI, NPN			
Q3	2SC3779(D)	TR. SI, NPN			
Q4	2SC3779(D)	TR. SI, NPN			
Q5	2SA1161	TR. SI, PNP			
Q6	2SA1161	TR. SI, PNP			
Q7	2SC3779(D)	TR. SI, NPN			
Q8	2SC3779(D)	TR. SI, NPN			
Q9	2SC3779(D)	TR. SI, NPN			
Q10	2SC3779(D)	TR. SI, NPN			
Q11	2SC3779(D)	TR. SI, NPN			
Q12	2SC3779(D)	TR. SI, NPN			
Q13	2SC1164(O)*S	TR. SI, NPN			
Q14	2SC1164(O)*S	TR. SI, NPN			
Q101	2SA1005(K)	TR. SI, PNP			
Q102	2SA1005(K)	TR. SI, PNP			
Q103	2SC3315(C)	TR. SI, NPN			
Q104	2SC3315(C)	TR. SI, NPN			
Q105	2SA1005(K)	TR. SI, PNP			
Q106	2SA1005(K)	TR. SI, PNP			
Q107	2SA1005(K)	TR. SI, PNP			
Q108	2SA1005(K)	TR. SI, PNP			
Q109	2SC3354(T,S)	TR. SI, NPN			
Q110	2SC3354(T,S)	TR. SI, NPN			
Q111	2SA1206	TR. SI, PNP			
Q112	2SC3354(T,S)	TR. SI, NPN			
Q113	2SC3354(T,S)	TR. SI, NPN			
Q114	2SC3600(E,F)	TR. SI, NPN			
Q115	2SC3600(E,F)	TR. SI, NPN			
Q116	2SA1406(E,F)	TR. SI, PNP			
Q117	2SA1406(E,F)	TR. SI, PNP			
Q201	2SC3315(C)	TR. SI, NPN			
Q202	2SC3315(C)	TR. SI, NPN			
Q203	2SC3354(T,S)	TR. SI, NPN			
Q204	2SC3354(T,S)	TR. SI, NPN			
Q205	2SC2785(F)	TR. SI, NPN			
Q206	2SC3315(C)	TR. SI, NPN			
Q207	2SC3315(C)	TR. SI, NPN			
Q208	2SC3354(T,S)	TR. SI, NPN			
Q209	2SC3354(T,S)	TR. SI, NPN			
Q210	2SC2785(F)	TR. SI, NPN			
R1	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R2	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R3	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R4	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R5	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R6	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R7	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R8	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R9	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R10	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R11	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R12	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R13	RD14BB2C303J	RES. CARBON	30K	5%	1/6W
R14	RD14BB2C753J	RES. CARBON	75K	5%	1/6W
R15	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R16	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R17	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R18	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R19	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R20	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R21	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R22	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R23	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R24	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R25	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R26	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R27	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R28	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R29	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R30	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R31	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R32	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R33	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R34	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R35	RN14BK2E82R0F	RES. METAL FILM	82.0	1%	1/4W
R36	RN14BK2E82R0F	RES. METAL FILM	82.0	1%	1/4W
R37	RN14BK2C3600F	RES. METAL FILM	360	1%	1/6W
R38	NO USE				
R39	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R40	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R41	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R42	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R43	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R44	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R45	RD14BB2E220J	RES. CARBON	22	5%	1/4W
R46	RD14BB2E220J	RES. CARBON	22	5%	1/4W
R47	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R48	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R49	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R50	R92-1420-05	RES. METAL FILM	510	5%	7W
R51	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R52	R92-1420-05	RES. METAL FILM	510	5%	7W
R53	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R54	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R55	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R56	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R59	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R101	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R102	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R103	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R104	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R105	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R106	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R107	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R108	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R109	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
R110	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R111	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R112	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R113	RD14BB2C431J	RES. CARBON	430	5%	1/6W
R114	RD14BB2C431J	RES. CARBON	430	5%	1/6W
R115	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R116	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R117	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R118	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R119	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R120	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R121	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R122	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R123	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R124	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R125	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R126	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R127	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R128	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R129	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R130	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R131	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R132	RN14BK2C1301F	RES. METAL FILM	1.3K	1%	1/6W
R133	RN14BK2C1301F	RES. METAL FILM	1.3K	1%	1/6W
R134	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R135	NO USE				
R136	RD14BB2C514J	RES. CARBON	510K	5%	1/6W
R137	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R138	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R139	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R140	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R141	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R142	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R143	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R144	RN14BK2E2002F	RES. METAL FILM	20K	1%	1/4W
R145	RN14BK2E2002F	RES. METAL FILM	20K	1%	1/4W
R146	R92-1434-05	RES. SPECIAL POWER	47K	5%	1/2W
R147	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R148	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R149	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R150	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R151	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R152	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R153	RN14BK2E2002F	RES. METAL FILM	20K	1%	1/4W
R154	RN14BK2E2002F	RES. METAL FILM	20K	1%	1/4W
R155	R92-1434-05	RES. SPECIAL POWER	47K	5%	1/2W
R156	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R157	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R158	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R159	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R160	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R161	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R162	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R163	NO USE				
R164	RD14BB2C203J	RES. CARBON	20K	5%	1/6W
R201	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R202	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R203	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R204	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R205	RD14BB2C621J	RES. CARBON	620	5%	1/6W
R206	RD14BB2C623J	RES. CARBON	62K	5%	1/6W
R207	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R208	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R209	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R210	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R211	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R212	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R213	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R214	RN14BK2C1800F	RES. METAL FILM	180	1%	1/6W
R215	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R216	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R217	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R218	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R219	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R220	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R221	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R222	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R223	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R224	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R225	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R226	RN14BK2C9101F	RES. METAL FILM	9.1K	1%	1/6W
R227	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R228	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R229	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
TC1	C05-0471-05	CAP. TRIMMER	30P		
TC2	C05-0460-05	CAP. TRIMMER	20P		
TC101	C05-0464-05	CAP. TRIMMER	2P		
TC102	NO USE				
TC103	C05-0464-05	CAP. TRIMMER	2P		
TH2	SDT100	THERMISTOR			
VR1	R12-1538-05	RES. SEMI FIXED	1KB		
VR2	NO USE				
VR3	R12-3453-05	RES. SEMI FIXED	10KB		
VR4	R12-0058-05	RES. SEMI FIXED	470 B		
VR101	R12-1538-05	RES. SEMI FIXED	1KB		
VR102	R12-0571-05	RES. SEMI FIXED	500 B		
VR103	R12-3453-05	RES. SEMI FIXED	10KB		
VR201	R12-3543-05	RES. SEMI FIXED	20KB		
VR202	R12-3543-05	RES. SEMI FIXED	20KB		

VOLUME UNIT

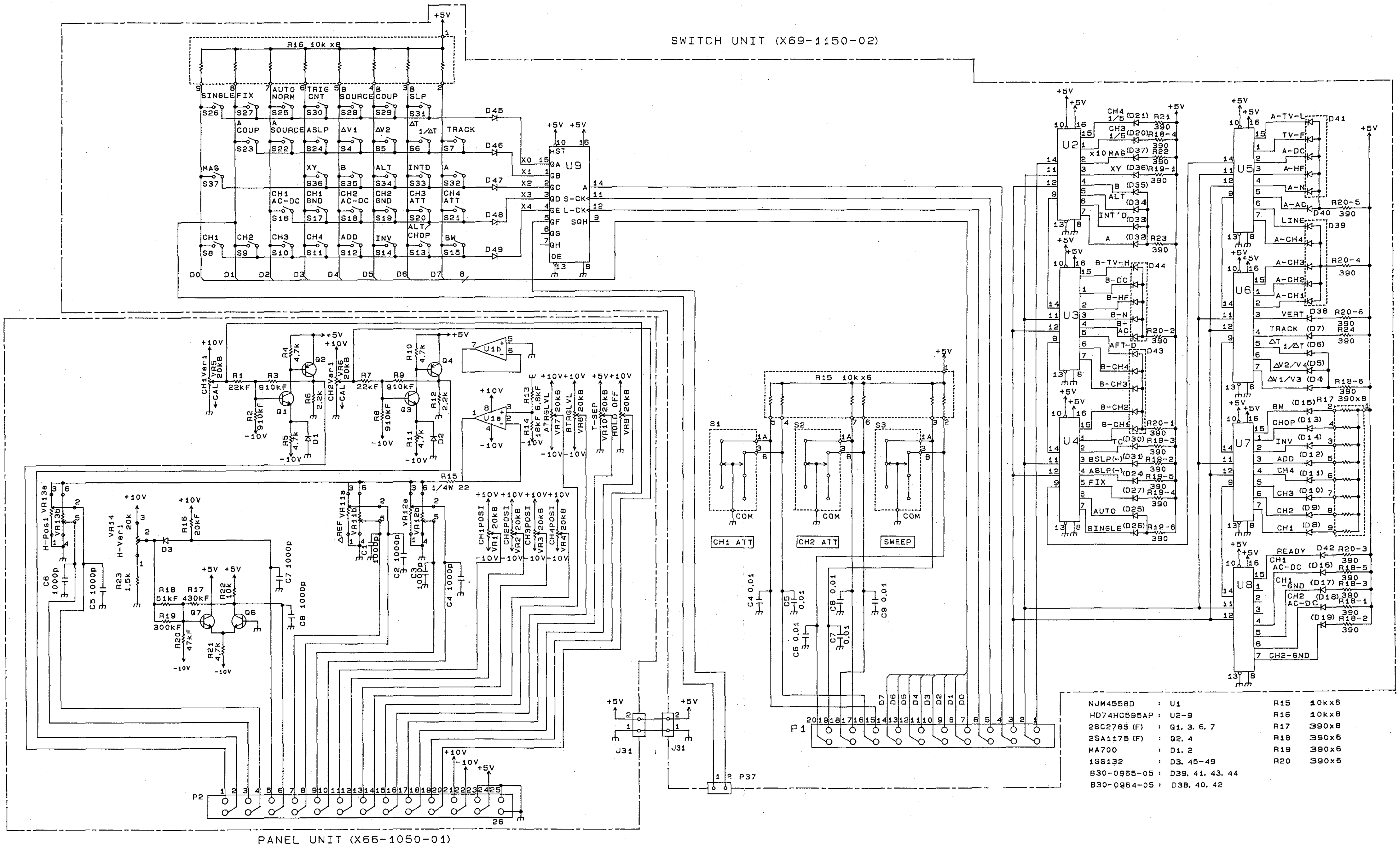
X81-2330-02

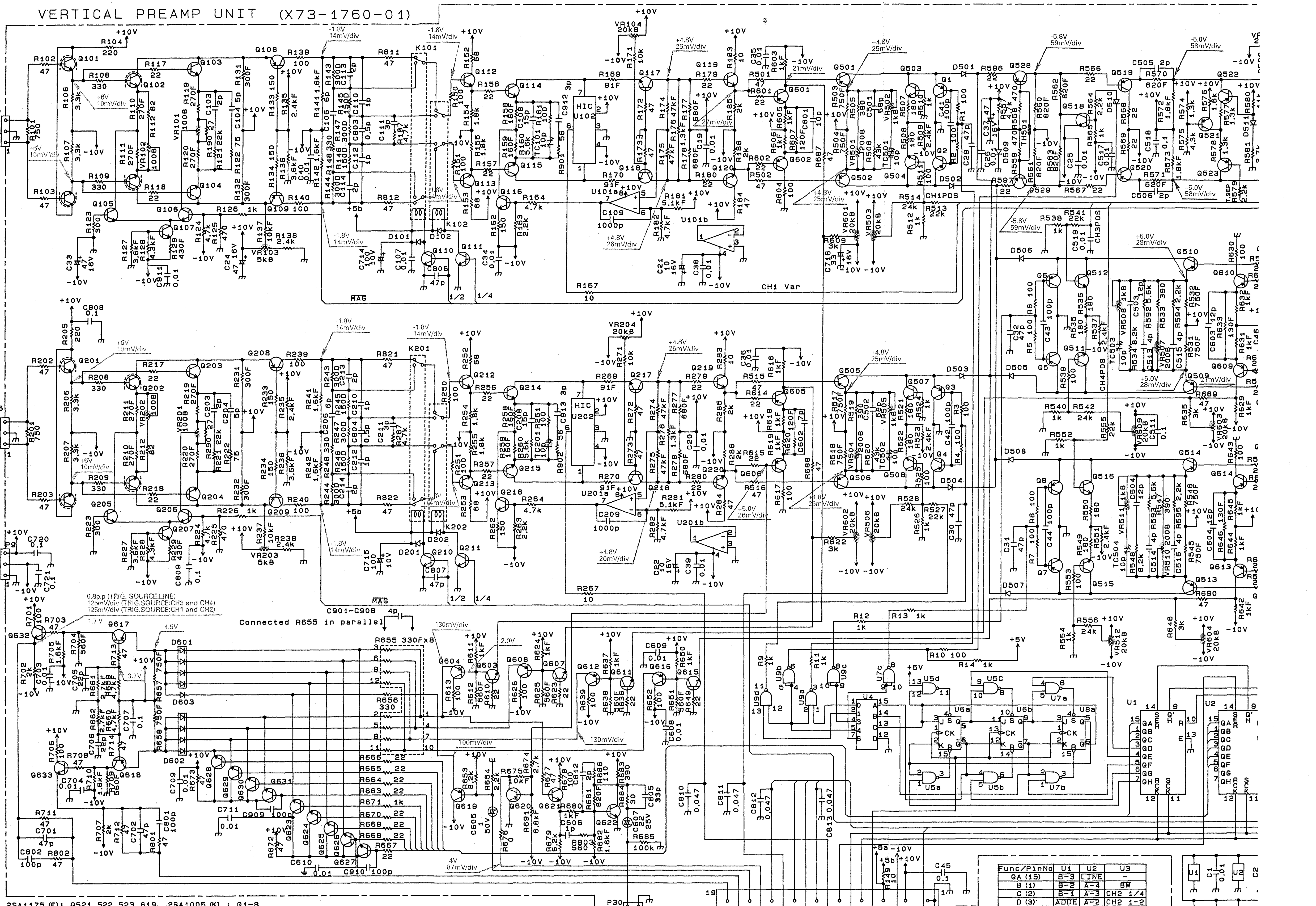
REF.NO	PARTS NO	NAME & DESCRIPTION			
	F01-0859-14	HEAT SINK			
	J21-4610-04	BRACKET			
	J73-0011-13	PCB (UNMOUNTED)			
	N09-0623-04	SCREW, SEMS PAN HD			
	R92-0150-05	JUMPING RES.	ZERO OHM(10MM)		
C6	CE04EW1C101M	CAP. ELECTRO	100	20%	16V
C7	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C8	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C9	CQ92M1H103J	CAP. MYLAR	0.01	5%	50V
C10	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C101	C91-0551-05	CAP. POLYESTER	0.22	10%	630V
C102	C91-0575-05	CAP. CERAMIC	1000P	20%	4KV
C103	C91-0575-05	CAP. CERAMIC	1000P	20%	4KV
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D3	MTZ24JC	DIODE, ZENER	23.72V		
J21	E31-5571-05	LEAD WIRE WITH CONNECTOR			
L101	L33-0808-05	CHOKE COIL			
P20	E40-0328-05	PIN CONNECTOR	3P		
P21	E40-0328-05	PIN CONNECTOR	3P		
P25	E40-3301-05	PIN CONNECTOR	4P		
P26	E40-3307-05	PIN CONNECTOR	10P		
P27	E40-3237-05	PIN CONNECTOR	2P		
P28	E40-3299-05	PIN CONNECTOR	2P		
P29	E40-3299-05	PIN CONNECTOR	2P		
Q1	2SC2271(D)	TR. SI, NPN			
Q2	2SC1384(Q)	TR. SI, NPN			
Q3	2SA684(Q)	TR. SI, PNP			
Q4	2SA1175(F)	TR. SI, PNP			
Q5	2SC2785(F)	TR. SI, NPN			
Q6	2SD1666(S)	TR. SI, NPN			
R1	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R2	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R3	RD14BB2C183J	RES. CARBON	18K	5%	1/6W
R4	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R5	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R6	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R7	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R8	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R9	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R10	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R11	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R12	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R13	RD14BB2C433J	RES. CARBON	43K	5%	1/6W
R14	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R15	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R16	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R17	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R18	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R19	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R20	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R21	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R22	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R23	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R24	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R25	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R26	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R101	RD14BY2H225J	RES. CARBON	2.2M	5%	1/2W
S101	S59-2505-05	SWITCH			
U1	NJM4558D	IC,DUAL OP AMP			
VR1	R05-3515-05	V.R. WITH SW(READOUT INT) 20KB			
VR2	R10-3505-05	V.R.(A/B INT,ROT+ILLUM)20KB X2			
VR3	R10-7501-05	V.R.(FOCUS/ASTIG)500KB/500KB			
VR4	R10-3505-05	V.R.(A/B INT,ROT+ILLUM)20KB X2			
VR5	R12-3543-05	RES. SEMI FIXED	20KB		
VR6	R12-1538-05	RES. SEMI FIXED	1KB		

SCHEMATIC DIAGRAM


CH1
CH2
CH3
CH4
ATT UNIT
X75-1180-01
JW5
JW6
CH1+
GND
CH1-
CH2+
CH2-
CH3+
CH3-
CH4+
CH4-
+10V
-10V
P4
P5
P6
P7
P8
P9
P10
P11
P30
CH1OUT
50mV/div
VERTICAL
PRE AMP UNIT
X73-1760-01
Y+
GND
Y-
Delay
LINE
FINAL UNIT
X80-1100-02
DFX-
DFX+
DFY+
DFY-
P12
P13
P14
P15
150XTM31
ANODE
R/O UNIT
X77-1490-01
A ROR
B ROA
C ROOFF
P3
CONNECTION UNIT
X77-1500-01
HIGH VOLTAGE UNIT
X68-1510-02
VR UNIT
X81-2330-02
A/4
P19
P23
P24
P25
P26
P27
P28
P29
ROT
CAL
LMP
-13V
Z AXIS
R1 470
C1 33p 500V
P1
P2
P18
P34
P17
PANEL UNIT
X66-1050-01
SWITCH UNIT
X69-1150-02
HORIZONTAL UNIT
X74-1480-02
LINE COUNTER UNIT
X76-1400-00
P35
AUTO/NORM
TV.CLOCK
DATA
TV.LOAD
TC.LOAD
TV' H'
TV.TRIG
P36
P37
P38
FOOT.SW
POWER SUPPLY UNIT
X68-1500-01
X81-2330-02 B/4
X81-2330-02 C/4
240V
220V
120V
100V
P20
P21

SCHEMATIC DIAGRAM


SWITCH UNIT (X69-1150-02)
PANEL UNIT (X66-1050-01)
R16 10k x8
R15 10k x6
U1a
U1b
U2
U3
U4
U5
U6
U7
U8
U9
S1
S2
S3
CH1 ATT
CH2 ATT
SWEEP
J31
P1
P2
P37
NJM4558D : U1
HD74HC595AP : U2~9
2SC2785 (F) : Q1, 3, 6, 7
2SA1175 (F) : Q2, 4
MA700 : D1, 2
1SS132 : D3, 45~49
B30-0965-05 : D39, 41, 43, 44
B30-0964-05 : D38, 40, 42
R15 10kx6
R16 10kx8
R17 390x8
R18 390x6
R19 390x6
R20 390x6


VERTICAL PREAMP UNIT (X73-1760-01)
CH1
CH2
P5
P6
ATT.P
MAG
1/2
1/4
CH1 Var
CH1POS
CH3POS
CH4POS
Connected R655 in parallel
0.8p.p (TRIG. SOURCE:LINE)
125mV/div (TRIG.SOURCE:CH3 and CH4)
125mV/div (TRIG.SOURCE:CH1 and CH2)
P30
CH1 OUT
P10
BTrig⊖ ATrig⊖
X ⊖
LINE.T
CH2Pos
CH1Pos
CH4Pos
CH3Pos
CH2Var
CH1Var
S.CLK
S.DATA
CLK
L.CLK
-10V
+5V
T.SEP
+10V

Func/PinNo	U1	U2	U3
QA (15)	$\overline{B-3}$	LINE	-
B (1)	$\overline{B-2}$	$\overline{A-4}$	$\overline{BW}$
C (2)	$\overline{B-1}$	$\overline{A-3}$	CH2 1/4
D (3)	$\overline{ADDE}$	$\overline{A-2}$	CH2 1-2
E (4)	$\overline{CH4E}$	$\overline{A-1}$	$\overline{CH2\ MAG}$
F (5)	$\overline{CE3E}$	$\overline{B-4}$	CH1 1/4
G (6)	$\overline{CH2E}$	-	CH1 1/2
H (7)	$\overline{CH1E}$	-	$\overline{CH1\ MAG}$

2SA1175 (F) : Q521, 522, 523, 619, Q620

2SA1206 : Q501, 502, 505, 506, Q509, 510, 513, 514, Q519, 520, 526, 527, Q601, 602, 604, 605, Q606, 608, 609, 610, Q612, 613, 614, 616

2SA1005 (K) : Q1~8

2SA1161 : Q108, 109, 208, 209, Q528, 529, 617, 618

2SC3315 (C) : Q105, 106, 107, 205, Q206, 207, 503, 504, Q507, 508, 511, 512, Q515, 516, 624, 625, Q626, 627, 628, 629, Q630, 631

2SC2785 (F) : Q116, 216, 623

2SC3732 (L) : Q518

2SC3779 (D) : Q103, 104, 112~115, Q117~120, 203, 204, Q212~215, 217~220, Q301~304, 401~404, Q524, 525, 603, 607, Q611, 615, 621, 622, Q632, 633

2SC4049 : Q110, 111, 210, 211

2SC4072 : Q101, 102, 201, 202

SN74ALS00AN : U5, 7, 9

SN74ALS112AN : U6, 8

HD74LS42P : U4

HD74HC595P : U1, 2, 3

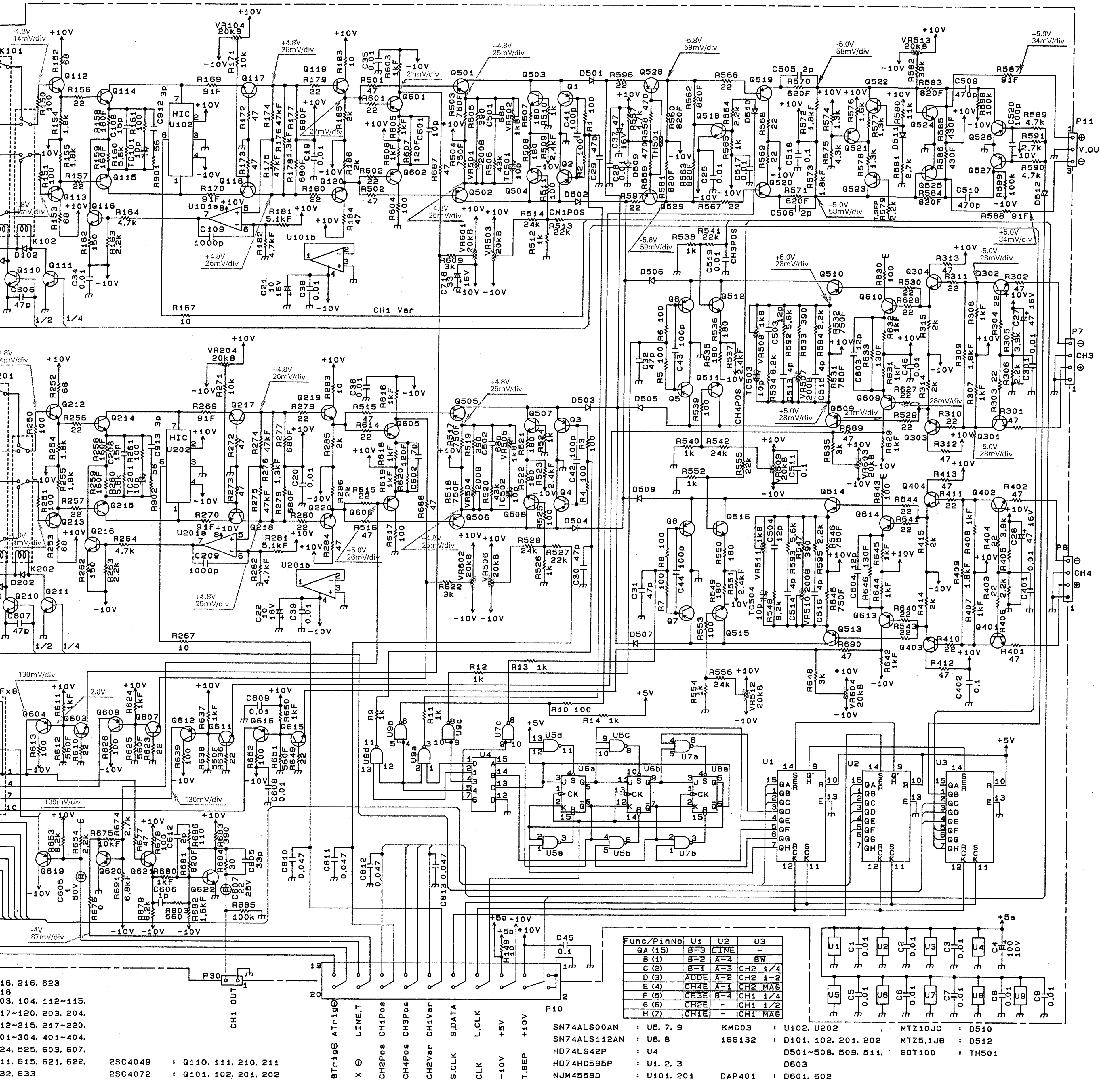
NJM4558D : U101, 201

KMC03 : U102, U202

1SS132 : D101, 102, 201, 202, D501~508, 509, 511, D603

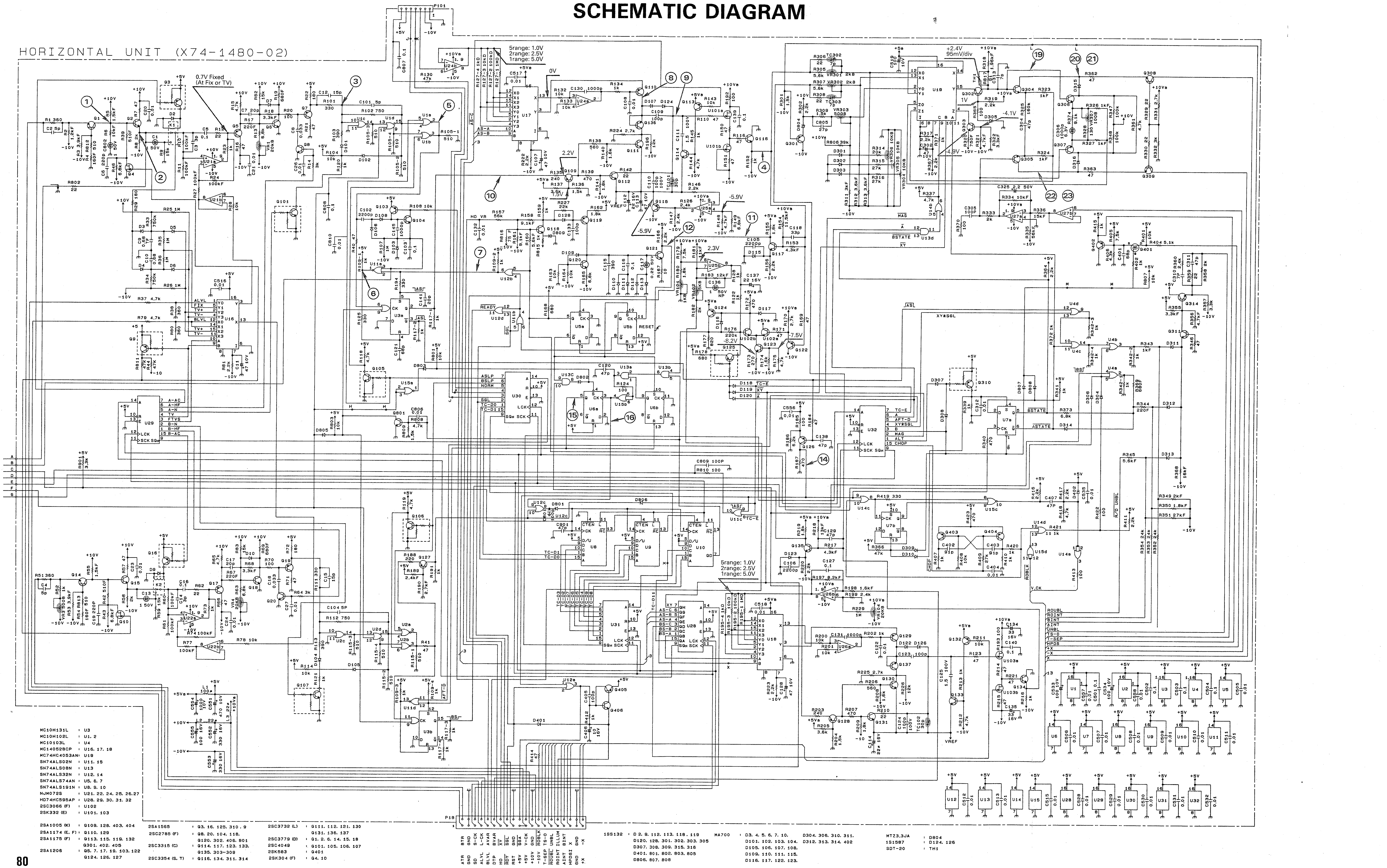
DAP401 : D601, 602

SCHEMATIC DIAGRAM


CH1 Var
CH1 OUT
P30
P10
P7 CH3
P8 CH4
P11 V.OUT
CH1POS
CH3POS
CH4POS
BTrig⊕ ATrig⊕
X ⊖ LINE.T
CH2Pos CH1Pos
CH4Pos CH3Pos
CH2Var CH1Var
S.CLK S.DATA
CLK L.CLK
-10V +5V
T.SEP +10V
Func/PinNo U1 U2 U3
QA (15) B-3 LINE -
B (1) B-2 A-4 BW
C (2) B-1 A-3 CH2 1/4
D (3) ADDE A-2 CH2 1-2
E (4) CH4E A-1 CH2 MAG
F (5) CE3E B-4 CH1 1/4
G (6) CH2E - CH1 1/2
H (7) CH1E - CH1 MAG
16, 216, 623
18
03, 104, 112~115,
17~120, 203, 204,
12~215, 217~220,
01~304, 401~404,
24, 525, 603, 607,
11, 615, 621, 622,
32, 633
2SC4049 : Q110, 111, 210, 211
2SC4072 : Q101, 102, 201, 202
SN74ALS00AN : U5, 7, 9
SN74ALS112AN : U6, 8
HD74LS42P : U4
HD74HC595P : U1, 2, 3
NJM4558D : U101, 201
KMC03 : U102, U202
1SS132 : D101, 102, 201, 202, D501~508, 509, 511, D603
DAP401 : D601, 602
MTZ10JC : D510
MTZ5.1JB : D512
SDT100 : TH501

SCHEMATIC DIAGRAM

HORIZONTAL UNIT (X74-1480-02)



P101
0.7V Fixed
(At Fix or TV)
5range: 1.0V
2range: 2.5V
1range: 5.0V
+2.4V
95mV/div
5range: 1.0V
2range: 2.5V
1range: 5.0V
P18

MC10H131L : U3
MC10H102L : U1. 2
MC10103L : U4
MC14052BCP : U16. 17. 18
MC74HC4053AN: U19
SN74ALS02N : U11. 15
SN74ALS08N : U13
SN74ALS32N : U12. 14
SN74ALS74AN : U5. 6. 7
SN74ALS191N : U8. 9. 10
NJM072S : U21. 22. 24. 25. 26.27
HD74HC595AP : U28. 29. 30. 31. 32
2SC3066 (F) : U102
2SK332 (E) : U101. 103

2SA1005 (K) : Q109. 128. 403. 404
2SA1174 (E. F) : Q110. 129
2SA1175 (F) : Q113. 115. 119. 132 Q301. 402. 405
2SA1206 : Q5. 7. 17. 19. 103. 122 Q124. 126. 127

2SA1565 : Q3. 16. 125. 310 . 9
2SC2785 (F) : Q8. 20. 104. 118. Q120. 302. 406. 801
2SC3315 (C) : Q114. 117. 123. 133. Q135. 303~309
2SC3354 (S. T) : Q116. 134. 311. 314

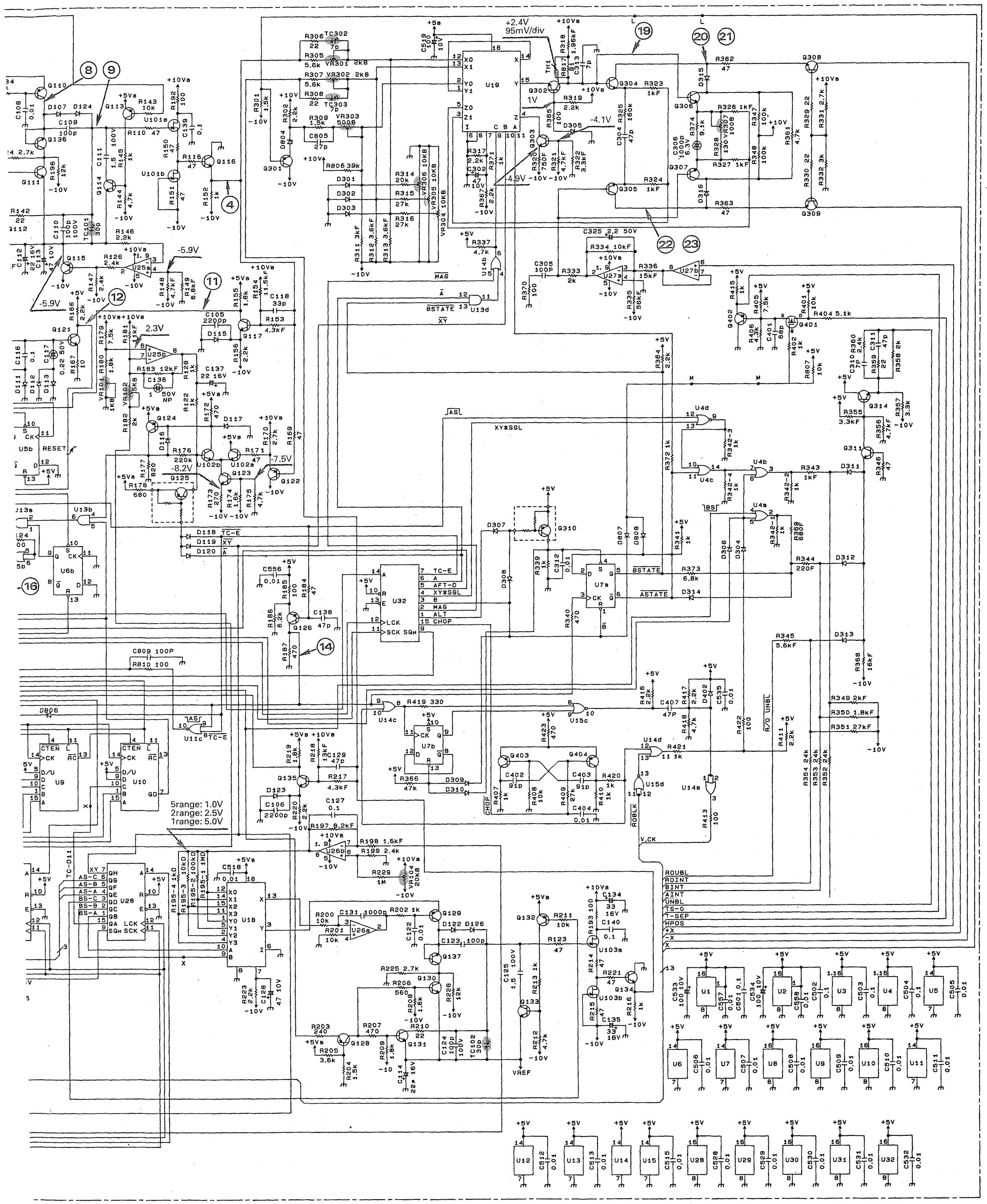
2SC3732 (L) : Q111. 112. 121. 130 Q131. 136. 137
2SC3779 (D) : Q1. 2. 6. 14. 15. 18
2SC4049 : Q101. 105. 106. 107
2SK583 : Q401
2SK304 (F) : Q4. 10

1SS132 : D 2. 9. 112. 113. 118. 119 D120. 128. 301. 302. 303. 305 D307. 308. 309. 315. 316 D401. 801. 802. 803. 805 D806. 807. 808

MA700 : D3. 4. 5. 6. 7. 10. D101. 102. 103. 104. D105. 106. 107. 108. D109. 110. 111. 115. D116. 117. 122. 123. D304. 306. 310. 311. D312. 313. 314. 402

MTZ3.3JA : D804
1S1587 : D124. 126
SDT-20 : TH1

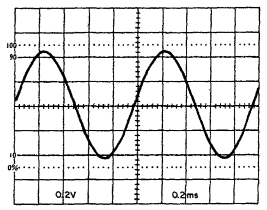
EMATIC DIAGRAM


+2.4V
95mV/div
-4.1V
-4.9V
-5.9V
2.3V
-8.2V
-7.5V
5range: 1.0V
2range: 2.5V
1range: 5.0V
U19
U32
U28
U18

: D 2, 9, 112, 113, 118, 119 MA700 : D3, 4, 5, 6, 7, 10, D304, 306, 310, 311, MTZ3.3JA : D804
D120, 128, 301, 302, 303, 305 D101, 102, 103, 104, D312, 313, 314, 402 1S1587 : D124, 126
D307, 308, 309, 315, 316 D105, 106, 107, 108, SDT-20 : TH1
D401, 801, 802, 803, 805 D109, 110, 111, 115,
D806, 807, 808 D116, 117, 122, 123,

SCHEMATIC DIAGRAM

①



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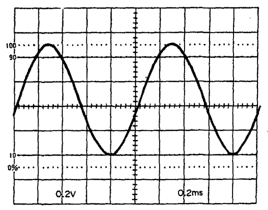

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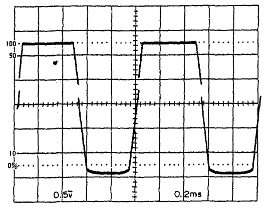

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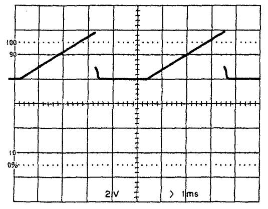

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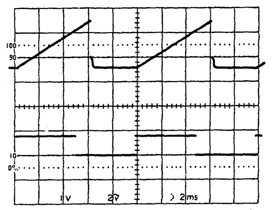

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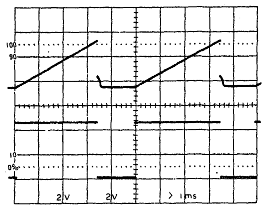

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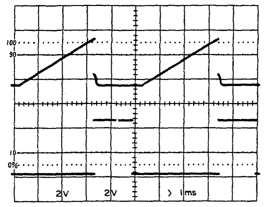

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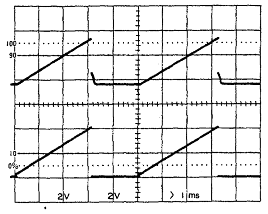

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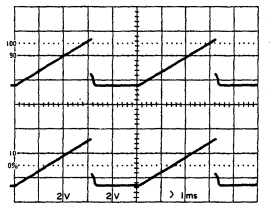

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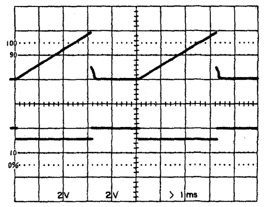

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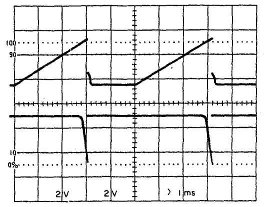

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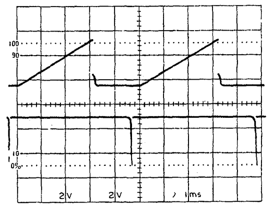

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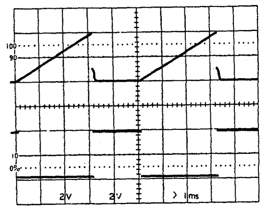

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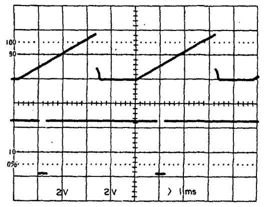

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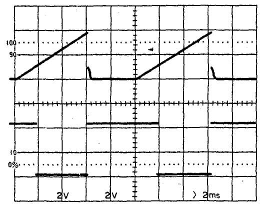

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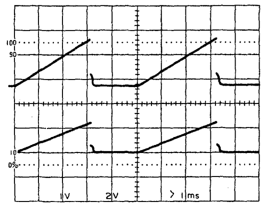

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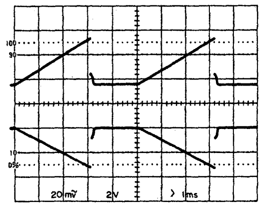

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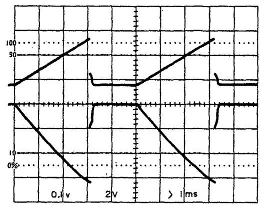

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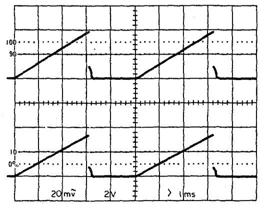

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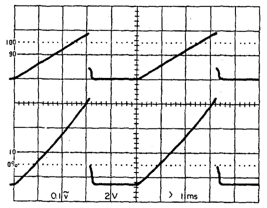
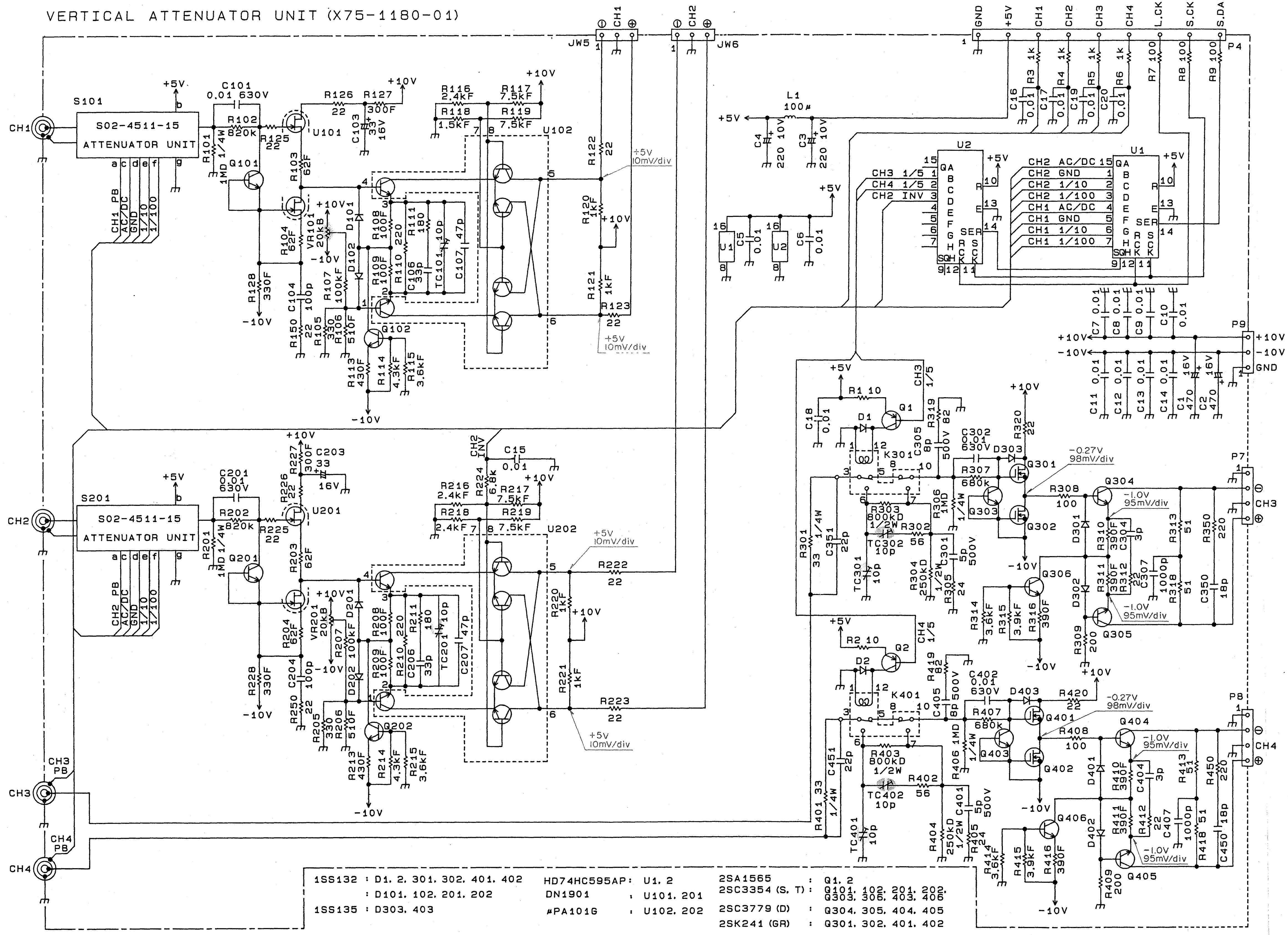


SCHEMATIC DIAGRAM


VERTICAL ATTENUATOR UNIT (X75-1180-01)
CH1
CH2
CH3
CH4
S101
S201
S02-4511-15
ATTENUATOR UNIT
CH1 PB
CH2 PB
AC/DC
GND
1/10
1/100
U101
U102
U201
U202
U1
U2
Q101
Q102
Q201
Q202
JW5
JW6
P4
P7
P8
P9
GND
+5V
L.CK
S.CK
S.DATA
CH1 PB
CH2 PB
CH3 PB
CH4 PB
+10V
-10V
+5V 10mV/div
-0.27V 98mV/div
-1.0V 95mV/div
K301
K401
Q1
Q2
Q301
Q302
Q303
Q304
Q305
Q306
Q401
Q402
Q403
Q404
Q405
Q406
CH3 1/5
CH4 1/5
CH2 INV

1SS132 : D1. 2. 301. 302. 401. 402
: D101. 102. 201. 202
1SS135 : D303. 403

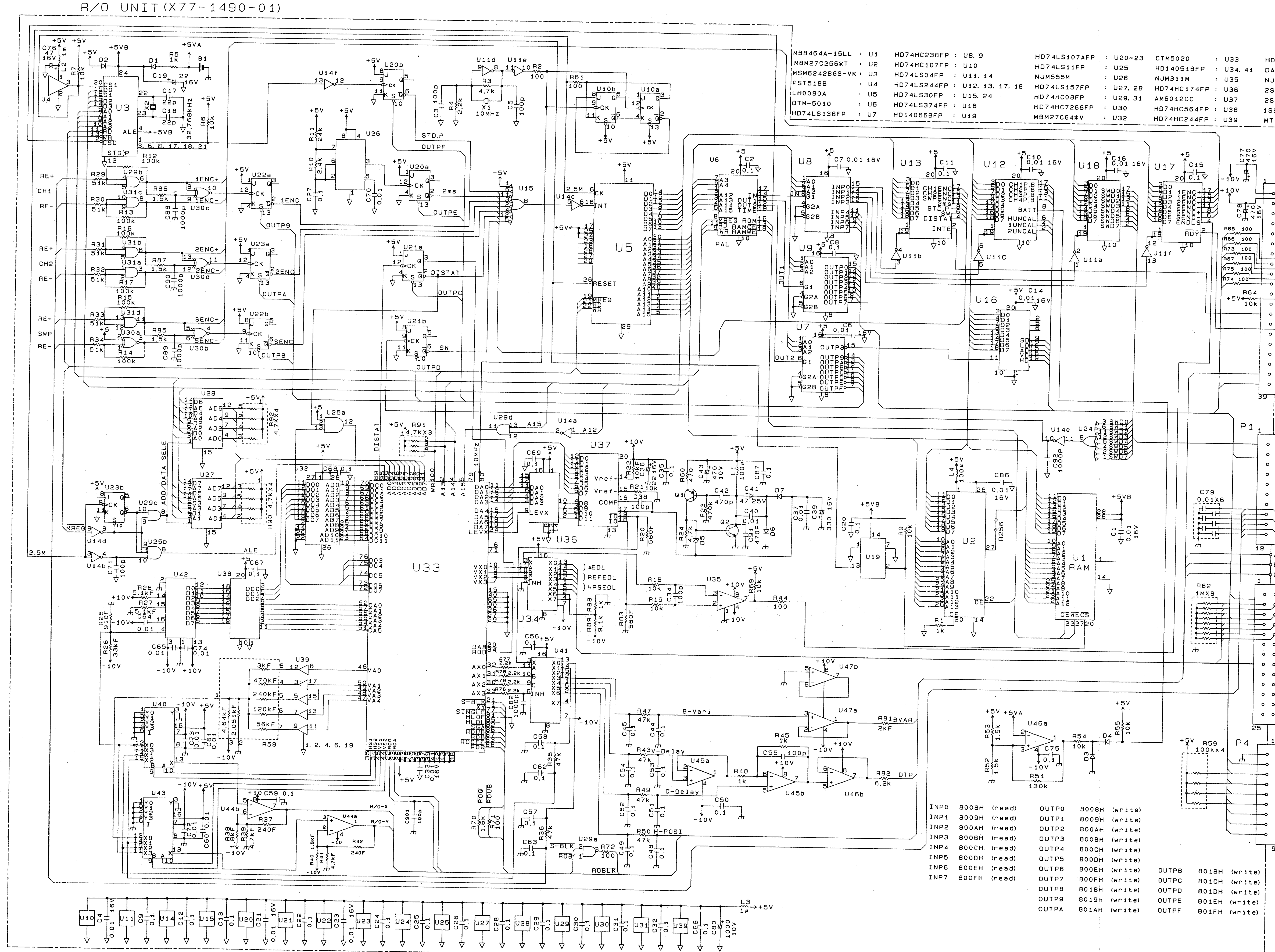
HD74HC595AP: U1. 2
DN1901 : U101. 201
μPA101G : U102. 202

2SA1565 : Q1. 2
2SC3354 (S. T) : Q101. 102. 201. 202. Q303. 306. 403. 406
2SC3779 (D) : Q304. 305. 404. 405
2SK241 (GR) : Q301. 302. 401. 402

FUNC/PinNo	U1	U2
E (4)	CH1 AC/DC	-
F (5)	CH1 GND	-
G (6)	CH1 1/10	-
H (7)	CH1 1/100	-

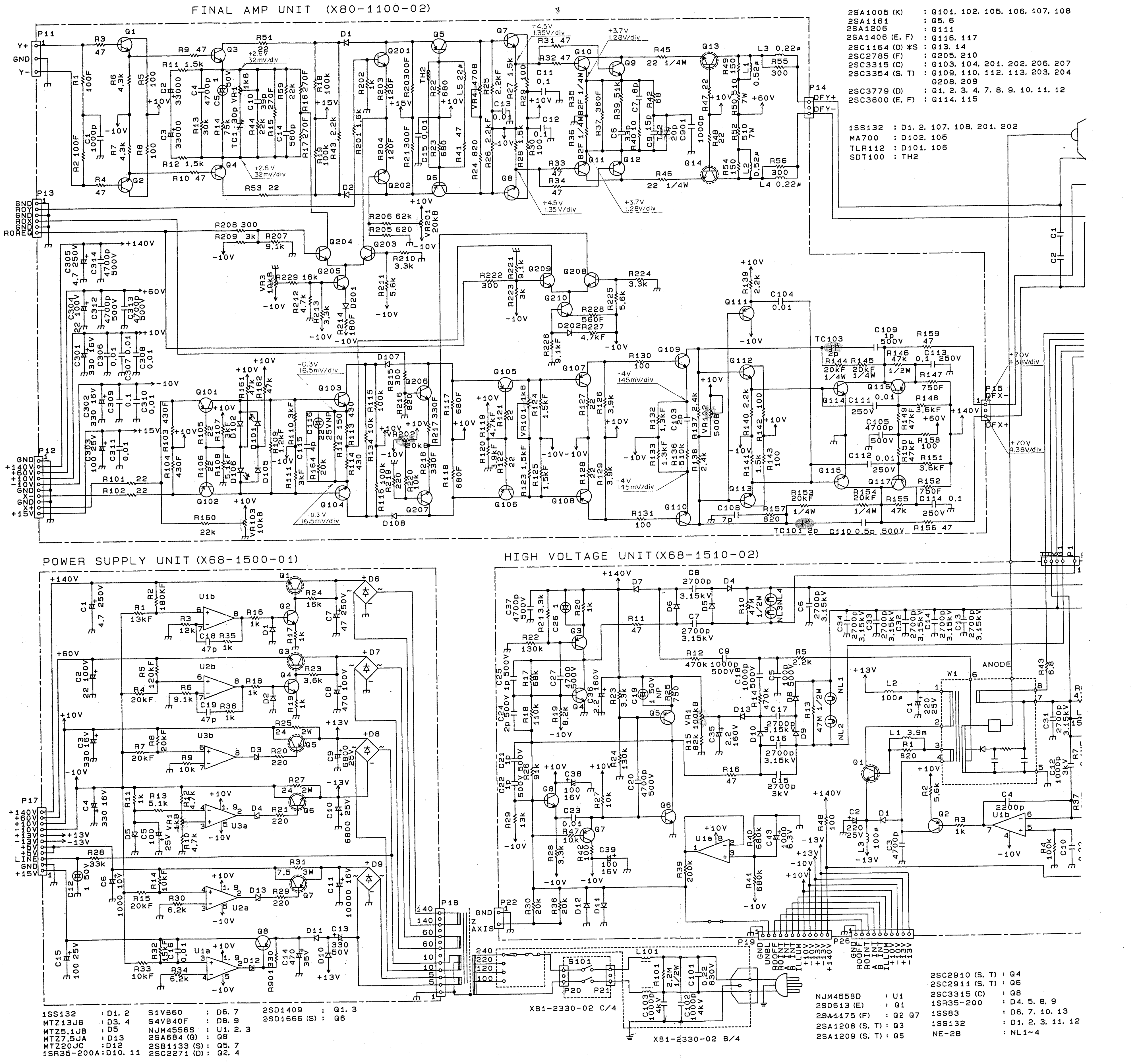
FUNC/PinNo	U1	U2
QA (15)	CH2 AC/DC	-
B (1)	CH2 GND	CH3 1/5
C (2)	CH2 1/10	CH4 1/5
D (3)	CH2 1/100	CH2 INV

SCHEMATIC DIAGRAM

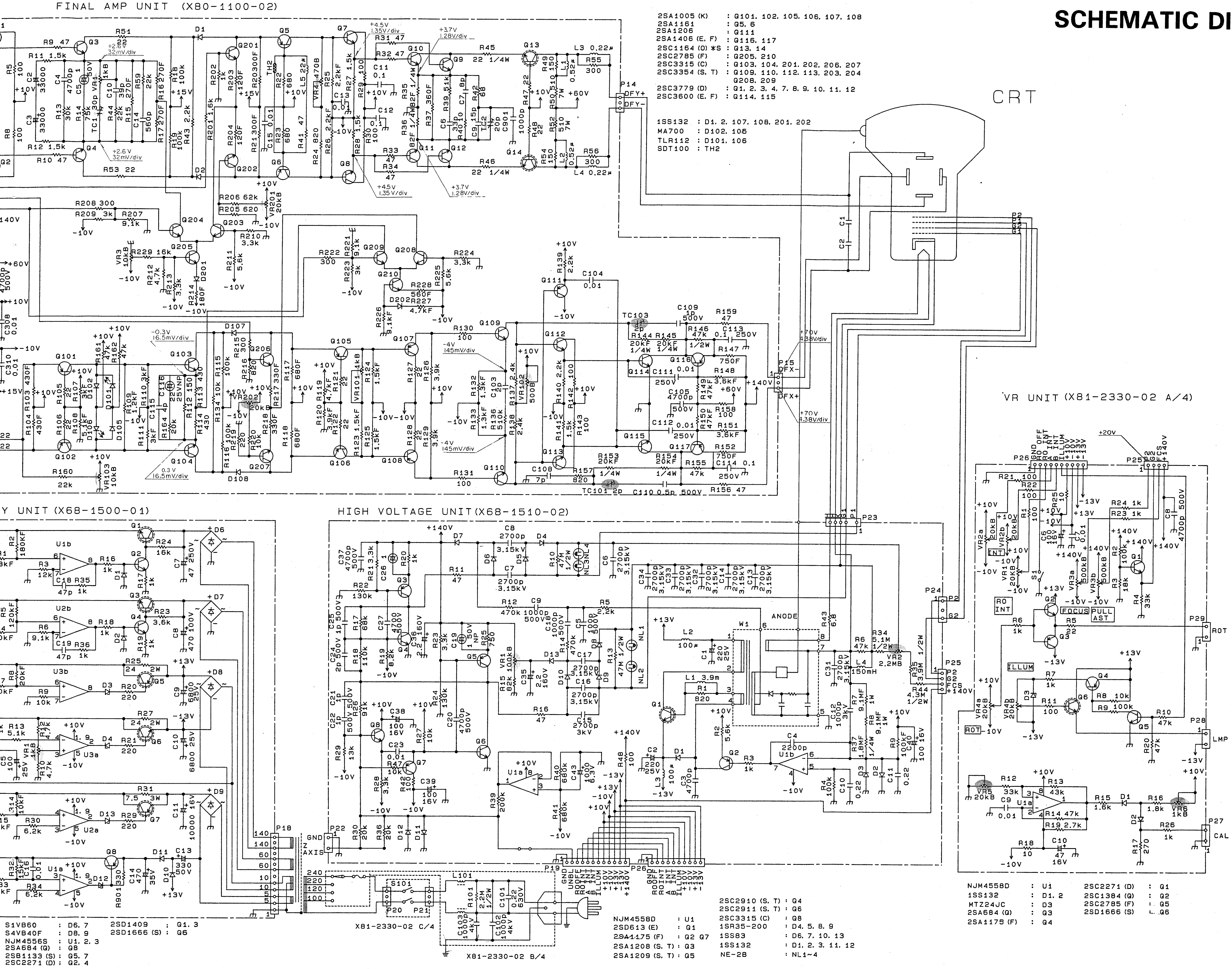

R/O UNIT (X77-1490-01)
U1
U2
U3
U5
U6
U7
U8
U9
U12
U13
U16
U17
U18
U33
U34
U36
U37
P1
P2
P3
P4
RE+
CH1
RE-
CH2
SWP
1ENC
2ENC
SENC
DISTAT
SW
STD.P
OUTPF
OUTPE
OUTP9
OUTPA
OUTPB
OUTPC
OUTPD
B-Vari
V-Delay
C-Delay
H-POSI
S-BLK
ROBLK
BVAR
DTP
R/O-X
R/O-Y
ADD/DATA SELE
ALE
10MHz
32.768kHz
2.5M
L3
+5V
GND
+10V
-10V
SINGLE
HPOSI
AVAR
VD
VSC
VLC
SD
S-CK
ROOFF
ROBLK
INTE
SGA
ROREQ
XY
RST
RDY
2POSI
1POSI
4POSI
3POSI
BLVL
ALVL
HO
T-SEP
2VAR
1VAR
LD
LSC
LLC
SSC
SLC
SWD0
SWD1
SWD2
SWD3
SWD4
SWD5
SWD6
SWD7
1ENC+
1ENC-
2ENC+
2ENC-
SENC+
SENC-
ROR
ROA
1UNCAL
2UNCAL
HPSEDL
HVREDL
H.UNCAL
REFEDL
AEDL
CH1 PB
CH2 PB
CH3 PB
CH4 PB
ALC(INP5)
ASC(OUTP2)
AD

MB8464A-15LL	: U1	HD74HC238FP	: U8, 9	HD74LS107AFP	: U20~23	CTM5020	: U33	HD14052BFP	: U40, 43
MBM27C256*T	: U2	HD74HC107FP	: U10	HD74LS11FP	: U25	HD14051BFP	: U34, 41	DAC0808LCN	: U42
MSM6242BGS-VK	: U3	HD74LS04FP	: U11, 14	NJM555M	: U26	NJM311M	: U35	NJM072M	: U44~47
PST518B	: U4	HD74LS244FP	: U12, 13, 17, 18	HD74LS157FP	: U27, 28	HD74HC174FP	: U36	2SA1175 (F)	: Q1
LH0080A	: U5	HD74LS30FP	: U15, 24	HD74HC08FP	: U29, 31	AM6012DC	: U37	2SC1384 (R, S)	: Q2
DTM-5010	: U6	HD74LS374FP	: U16	HD74HC7266FP	: U30	HD74HC564FP	: U38	1SS132	: D1~4, 6, 7
HD74LS138FP	: U7	HD14066BFP	: U19	MBM27C64*V	: U32	HD74HC244FP	: U39	MTZ12JC	: D5

INP0	8008H	(read)	OUTP0	8008H	(write)			
INP1	8009H	(read)	OUTP1	8009H	(write)			
INP2	800AH	(read)	OUTP2	800AH	(write)			
INP3	800BH	(read)	OUTP3	800BH	(write)			
INP4	800CH	(read)	OUTP4	800CH	(write)			
INP5	800DH	(read)	OUTP5	800DH	(write)			
INP6	800EH	(read)	OUTP6	800EH	(write)	OUTPB	801BH	(write)
INP7	800FH	(read)	OUTP7	800FH	(write)	OUTPC	801CH	(write)
			OUTP8	8018H	(write)	OUTPD	801DH	(write)
			OUTP9	8019H	(write)	OUTPE	801EH	(write)
			OUTPA	801AH	(write)	OUTPF	801FH	(write)


FINAL AMP UNIT (X80-1100-02)
POWER SUPPLY UNIT (X68-1500-01)
HIGH VOLTAGE UNIT (X68-1510-02)
X81-2330-02 C/4
X81-2330-02 B/4
2SA1005 (K) : Q101, 102, 105, 106, 107, 108
2SA1161 : Q5, 6
2SA1206 : Q111
2SA1406 (E, F) : Q116, 117
2SC1164 (O) *S : Q13, 14
2SC2785 (F) : Q205, 210
2SC3315 (C) : Q103, 104, 201, 202, 206, 207
2SC3354 (S, T) : Q109, 110, 112, 113, 203, 204
Q208, 209
2SC3779 (D) : Q1, 2, 3, 4, 7, 8, 9, 10, 11, 12
2SC3600 (E, F) : Q114, 115
1SS132 : D1, 2, 107, 108, 201, 202
MA700 : D102, 105
TLR112 : D101, 106
SDT100 : TH2
1SS132 : D1, 2
MTZ13JB : D3, 4
MTZ5.1JB : D5
MTZ7.5JA : D13
MTZ20JC : D12
1SR35-200A : D10, 11
S1VB60 : D6, 7
S4VB40F : D8, 9
NJM4556S : U1, 2, 3
2SA684 (Q) : Q8
2SB1133 (S) : Q5, 7
2SC2271 (D) : Q2, 4
2SD1409 : Q1, 3
2SD1666 (S) : Q6
NJM4558D : U1
2SD613 (E) : Q1
2SA1175 (F) : Q2 Q7
2SA1208 (S, T) : Q3
2SA1209 (S, T) : Q5
2SC2910 (S, T) : Q4
2SC2911 (S, T) : Q6
2SC3315 (C) : Q8
1SR35-200 : D4, 5, 8, 9
1SS83 : D6, 7, 10, 13
1SS132 : D1, 2, 3, 11, 12
NE-2B : NL1~4

SCHEMATIC DIAGRAM


FINAL AMP UNIT (X80-1100-02)
CRT
VR UNIT (X81-2330-02 A/4)
Y UNIT (X68-1500-01)
HIGH VOLTAGE UNIT (X68-1510-02)
X81-2330-02 C/4
X81-2330-02 B/4
ANODE
DFY+
DFY-
DFX+
DFX-
ROT
LMP
CAL
FOCUS
ASTIG
INT
ILLUM
Z AXIS

2SA1005 (K) : Q101, 102, 105, 106, 107, 108
2SA1161 : Q5, 6
2SA1206 : Q111
2SA1406 (E, F) : Q116, 117
2SC1164 (O) *S : Q13, 14
2SC2785 (F) : Q205, 210
2SC3315 (C) : Q103, 104, 201, 202, 206, 207
2SC3354 (S, T) : Q109, 110, 112, 113, 203, 204
Q208, 209
2SC3779 (D) : Q1, 2, 3, 4, 7, 8, 9, 10, 11, 12
2SC3600 (E, F) : Q114, 115

1SS132 : D1, 2, 107, 108, 201, 202
MA700 : D102, 105
TLR112 : D101, 106
SDT100 : TH2

S1VB60 : D6, 7
S4VB40F : D8, 9
NJM4556S : U1, 2, 3
2SA684 (Q) : Q8
2SB1133 (S) : Q5, 7
2SC2271 (D) : Q2, 4

2SD1409 : Q1, 3
2SD1666 (S) : Q6

NJM4558D : U1
2SD613 (E) : Q1
2SA1175 (F) : Q2 Q7
2SA1208 (S, T) : Q3
2SA1209 (S, T) : Q5

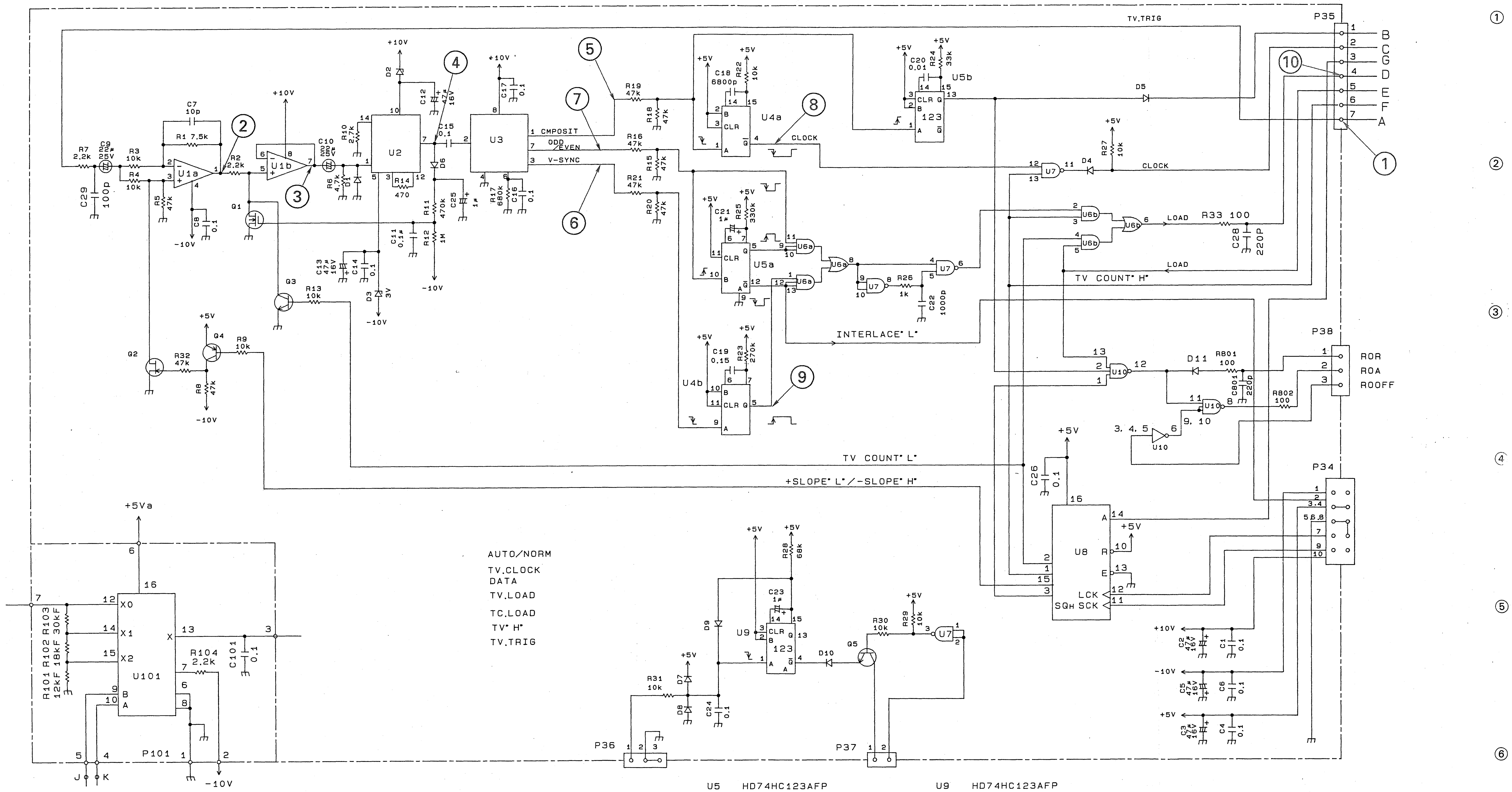
2SC2910 (S, T) : Q4
2SC2911 (S, T) : Q6
2SC3315 (C) : Q8
1SR35-200 : D4, 5, 8, 9
1SS83 : D6, 7, 10, 13
1SS132 : D1, 2, 3, 11, 12
NE-2B : NL1~4

NJM4558D : U1
1SS132 : D1, 2
MTZ24JC : D3
2SA684 (Q) : Q3
2SA1175 (F) : Q4

2SC2271 (D) : Q1
2SC1384 (Q) : Q2
2SC2785 (F) : Q5
2SD1666 (S) : Q6

SCHEMATIC DIAGRAM

LINE COUNTER UNIT (X76-1400-00)


TV.TRIG
P35
B
C
G
D
E
F
A
⑩
①
②
③
④
⑤
⑥
⑦
⑧
⑨
+10V
C7 10p
R1 7.5k
R7 2.2k
C9 22μ 25V
R3 10k
R4 10k
C29 100p
R5 47k
U1a
R2 2.2k
U1b
C8 0.1
-10V
Q1
C10 22μ 25V
R6 4.7k
D1
R10 2.7k
U2
R14 470
D2
C12 47μ 16V
C15 0.1
D6
R11 470k
R12 1M
C11 0.1μ
C13 47μ 16V
C14 0.1
D3 3V
C25 1μ
U3
C17 0.1
R17 680k
C16 0.1
CMPOSIT
ODD/EVEN
V-SYNC
R19 47k
R18 47k
R16 47k
R15 47k
R21 47k
R20 47k
Q3
R13 10k
Q4
R9 10k
Q2
R32 47k
R8 47k
+5V
C18 6800p
R22 10k
U4a
CLR
CLOCK
C20 0.01
R24 33k
U5b
123
D5
R27 10k
D4
U7
C21 1μ
R25 330k
U5a
U6a
U6b
R26 1k
C22 1000p
LOAD
R33 100
C28 220P
TV COUNT' H'
INTERLACE' L'
C19 0.15
R23 270k
U4b
P38
ROR
ROA
ROOFF
U10
D11
R801 100
C801 220p
R802 100
3. 4. 5
9. 10
TV COUNT' L'
+SLOPE' L'/-SLOPE' H'
C26 0.1
P34
U8
A
R
E
LCK
SQH SCK
+10V
C2 47μ 16V
C1 0.1
C5 47μ 16V
C6 0.1
C3 47μ 16V
C4 0.1
+5Va
R101 12kF
R102 18kF
R103 30kF
X0
X1
X2
U101
B
A
X
R104 2.2k
C101 0.1
P101
J
K
AUTO/NORM
TV.CLOCK
DATA
TV.LOAD
TC.LOAD
TV' H'
TV.TRIG
R28 68k
C23 1μ
U9
D9
D10
Q5
R30 10k
R29 10k
R31 10k
D7
D8
C24 0.1
P36
P37

2SC2785 (F) : Q3 . 5

2SA1175 (F) : Q4

2SK241 (GR) : Q1

2SK304 (F) : Q2

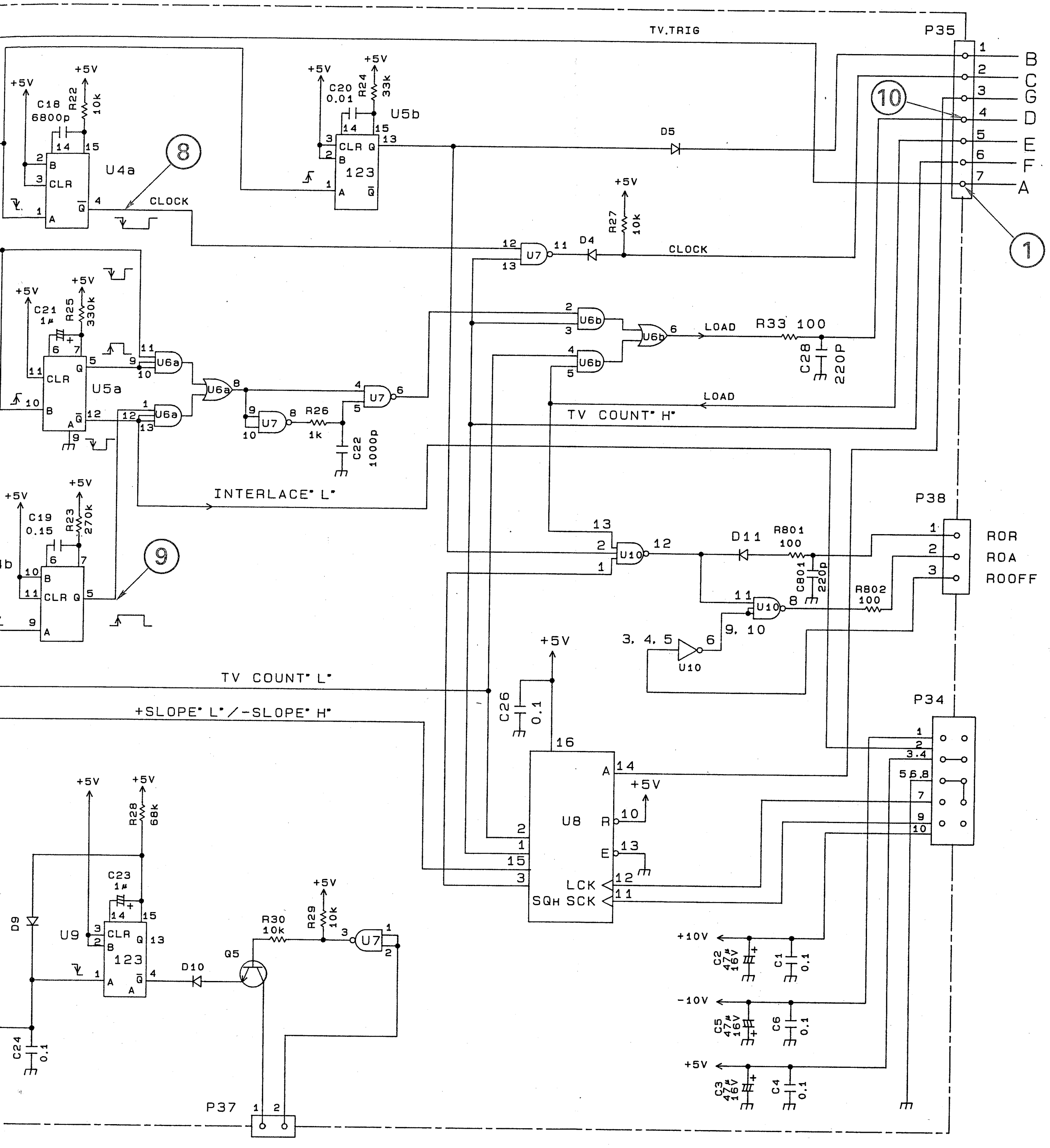
1SS132 : D4 5 6 7 8 9 11

MA700 : D1. 10

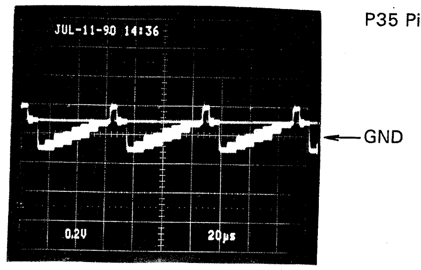
MTZ3.0JA : D2 . 3

U1	NJM072M
U2	UA733CNS
U3	LM1881M
U4	HD74HC221FP
U5	HD74HC123AFP
U6	HD74HC58F
U7	HD74HC00FP
U8	HD74HC595FP
U9	HD74HC123AFP
U10	HD74HC10FP
U101	HD14052BFP

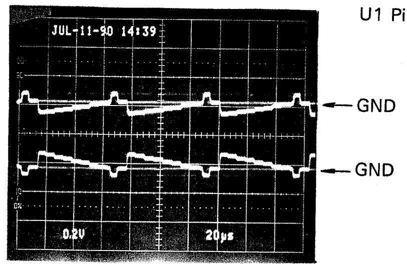
DIAGRAM


TV.TRIG
P35
B
C
G
D
E
F
A
+5V
C18 6800p
R22 10k
U4a
CLR
CLOCK
C20 0.01
R24 33k
U5b
123
D5
R27 10k
D4
U7
LOAD
R33 100
C28 220P
TV COUNT" H"
C21 1µ
R25 330k
U5a
U6a
U6b
R26 1k
C22 1000p
INTERLACE" L"
C19 0.15
R23 270k
P38
ROR
ROA
ROOFF
U10
D11
R801 100
C801 220p
R802 100
3, 4, 5
9, 10
TV COUNT" L"
+SLOPE" L"/-SLOPE" H"
C26 0.1
U8
LCK
SQH SCK
P34
R28 68k
C23 1µ
U9
D9
D10
Q5
R30 10k
R29 10k
C24 0.1
+10V
-10V
C2 47µ 16V
C1 0.1
C5 47µ 16V
C6 0.1
C3 47µ 16V
C4 0.1
P37

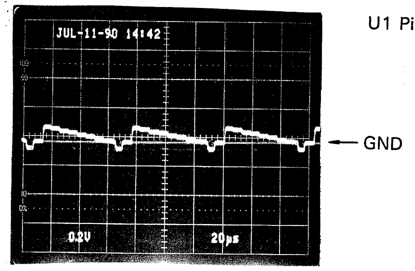
U5	HD74HC123AFP	U9	HD74HC123AFP
U6	HD74HC58F	U10	HD74HC10FP
U7	HD74HC00FP	U101	HD14052BFP
U8	HD74HC595FP		

①


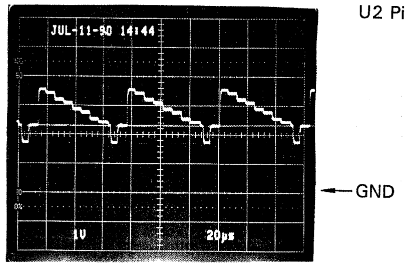
P35 Pin 7

②


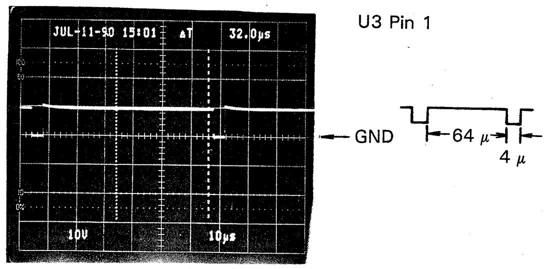
U1 Pin1

③


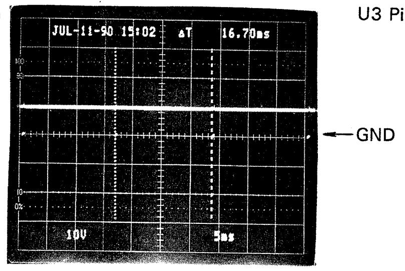
U1 Pin 7

④


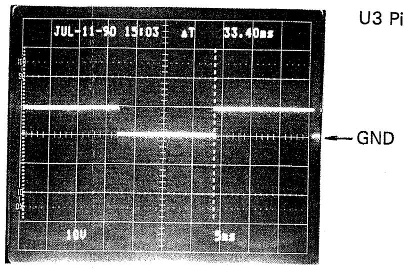
U2 Pin 7

⑤


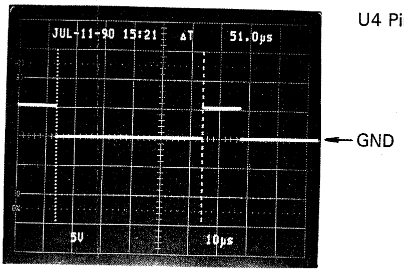
U3 Pin 1

⑥


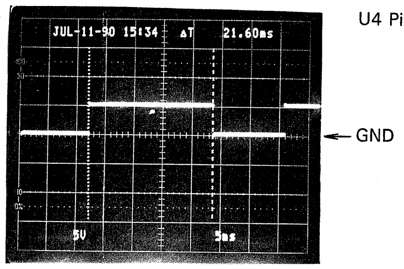
U3 Pin3

⑦


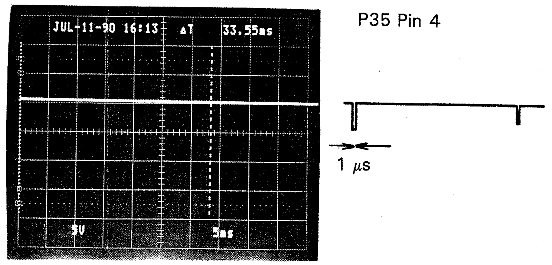
U3 Pin 7

⑧


U4 Pin 4

⑨


U4 Pin 5

⑩


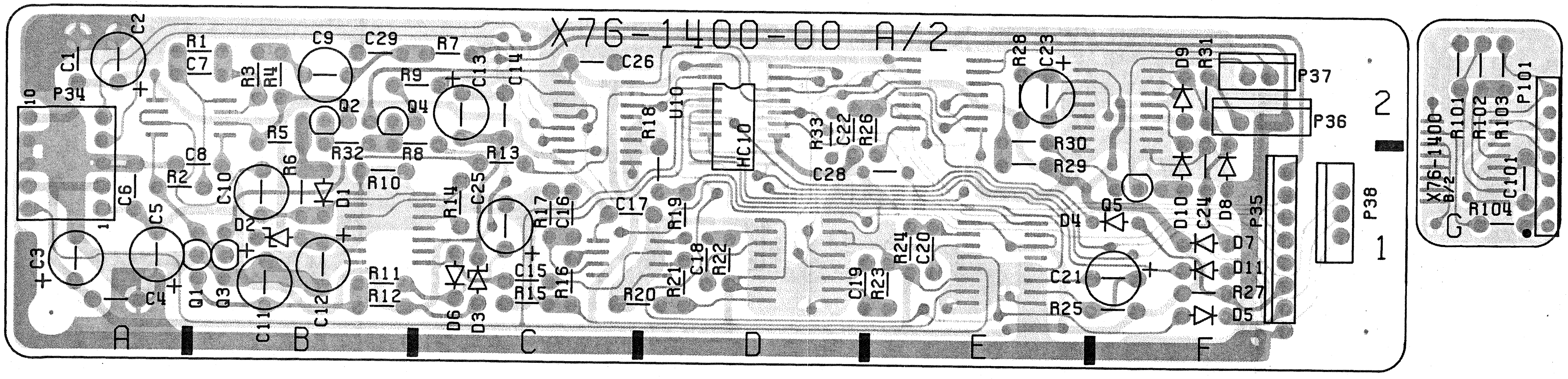
P35 Pin 4

U8		TV COUNT	Ohter
	Pin1	H	L
	Pin 2	L	H
	When TV COUNT + A SWEEP is faster than 0.2 ms		Ohter
	Pin 3	H	L
	When TV COUNT:	SLOPE "+"	SLOPE "−"
	Pin 15	L	H

U5		When TV signal is input	When TV signal is not present
	Pin 13	H	L
		When INTERLACED signal is input	When PROGRESSIVE signal is input
	Pin 5	H	L
	Pin 12	L	H

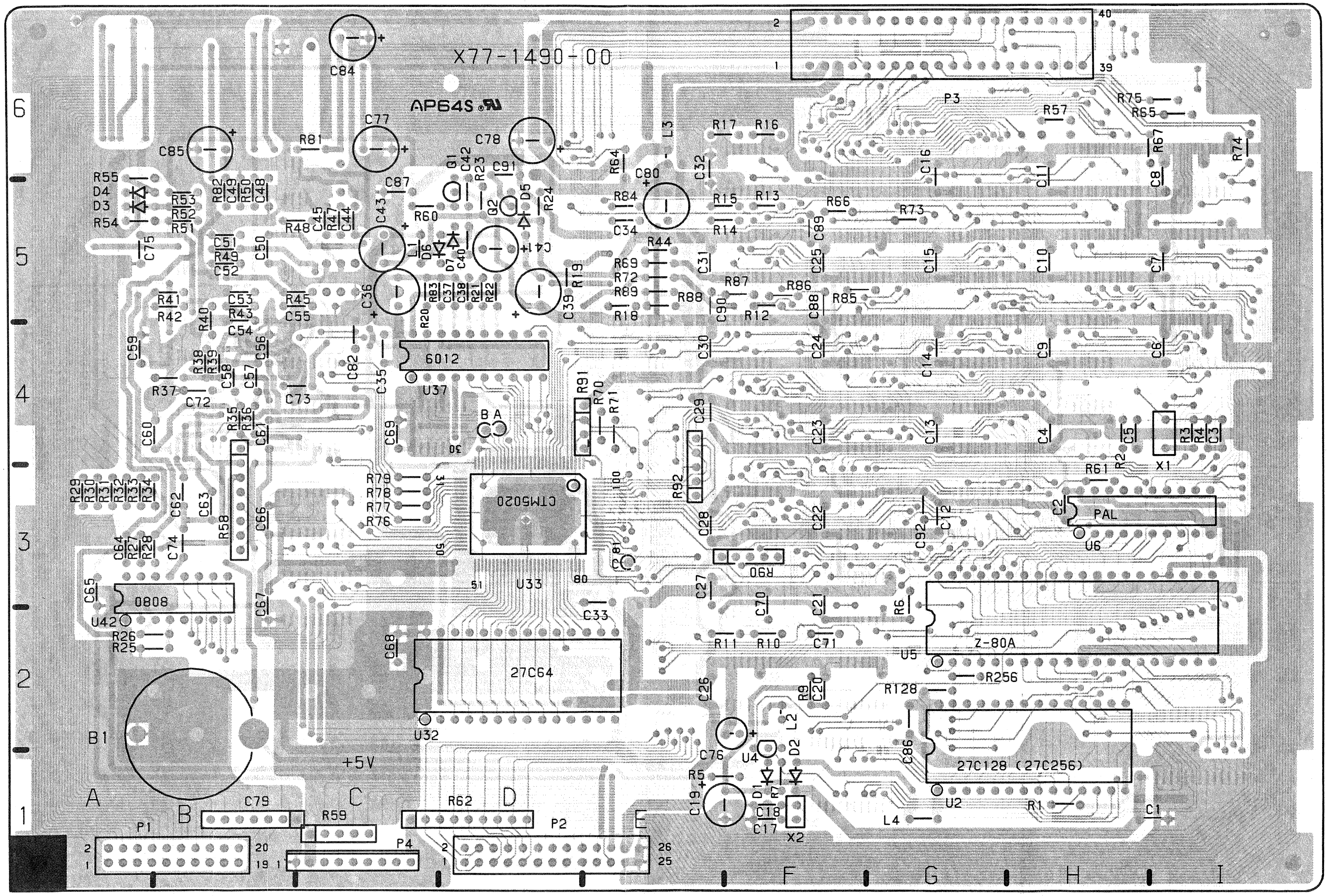
P.C BOARD

LINE COUNTER UNIT (X76-1400-00)


X76-1400-00 A/2
C1
C2
P34
10
1
R1
C7
R3
R4
C9
C29
R7
R9
C13
C14
C26
U10
R18
HC10
R33
C22
R26
R28
C23
D9
R31
P37
P36
2
R30
R29
Q2
Q4
R5
C8
R6
R32
R8
R13
R2
C10
D1
R10
C6
C5
C3
C4
Q1
Q3
D2
C11
C12
R14
C25
R17
C16
C17
R19
C28
C15
R15
R16
R11
R12
D6
D3
R20
R21
C18
R22
C19
R23
R24
C20
Q5
D4
D10
C24
D8
P35
P38
1
D7
D11
R27
C21
R25
D5
A
B
C
D
E
F
X76-1400 B/2
R101
R102
R103
P101
C101
R104
G

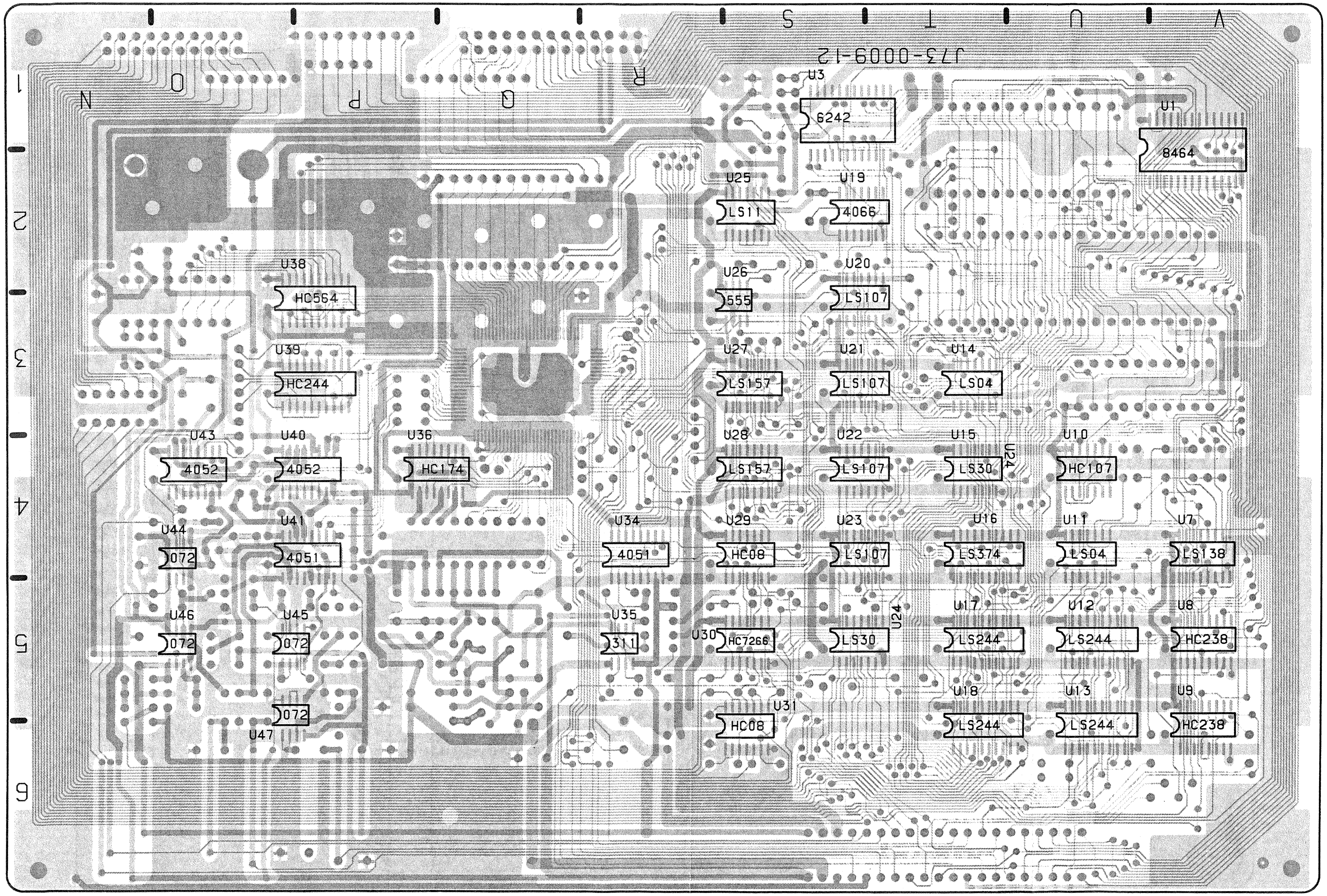
P.C BOARD

R/O UNIT (X77-1490-01) A


X77-1490-00
AP64S
1
2
39
40
P3
C84
C77
C78
C85
R81
Q1
C42
R23
C91
L3
R17
R16
R75
R65
R57
R67
R74
C32
R64
C80
C16
C11
C8
R55
D4
D3
R54
R53
R52
R51
R82
C49
R50
C48
C87
C43
C45
R47
C44
R48
R60
Q2
D5
R24
R84
C34
R15
R13
R14
R66
R73
C89
C75
C51
R49
C52
C50
L1
D6
D7
C40
C41
R19
R44
R69
R72
R89
R18
R88
C31
R87
R86
R85
C25
C15
C10
C7
C36
R83
C37
C38
R21
R22
C39
C90
R12
C88
R41
R42
R40
C53
R43
C54
R45
C55
R20
6012
U37
C59
R38
R39
C56
C58
C57
C82
C35
R37
C72
C73
C30
C24
C14
C9
C6
R91
R70
R71
R35
R36
C61
C60
C69
B
A
30
C29
C23
C13
C4
C5
R3
R4
C3
X1
R2
R61
R29
R30
R31
R32
R33
R34
C62
C63
R58
C66
R79
R78
R77
R76
31
CTM5020
100
R92
C28
C22
C12
C92
C2
PAL
U6
C64
R27
R28
C74
50
C81
R90
C65
0808
U42
R26
R25
C67
51
U33
80
C27
C70
C21
R6
Z-80A
U5
C33
R11
R10
C71
C68
27C64
U32
R256
R128
C26
R9
C20
L2
C86
27C128 (27C256)
U2
B1
+5V
C76
U4
D2
R5
C19
D1
R7
C18
C17
X2
L4
R1
C1
C79
R59
R62
P1
P4
P2
2
1
20
19
26
25
A
B
C
D
E
F
G
H
I
1
2
3
4
5
6

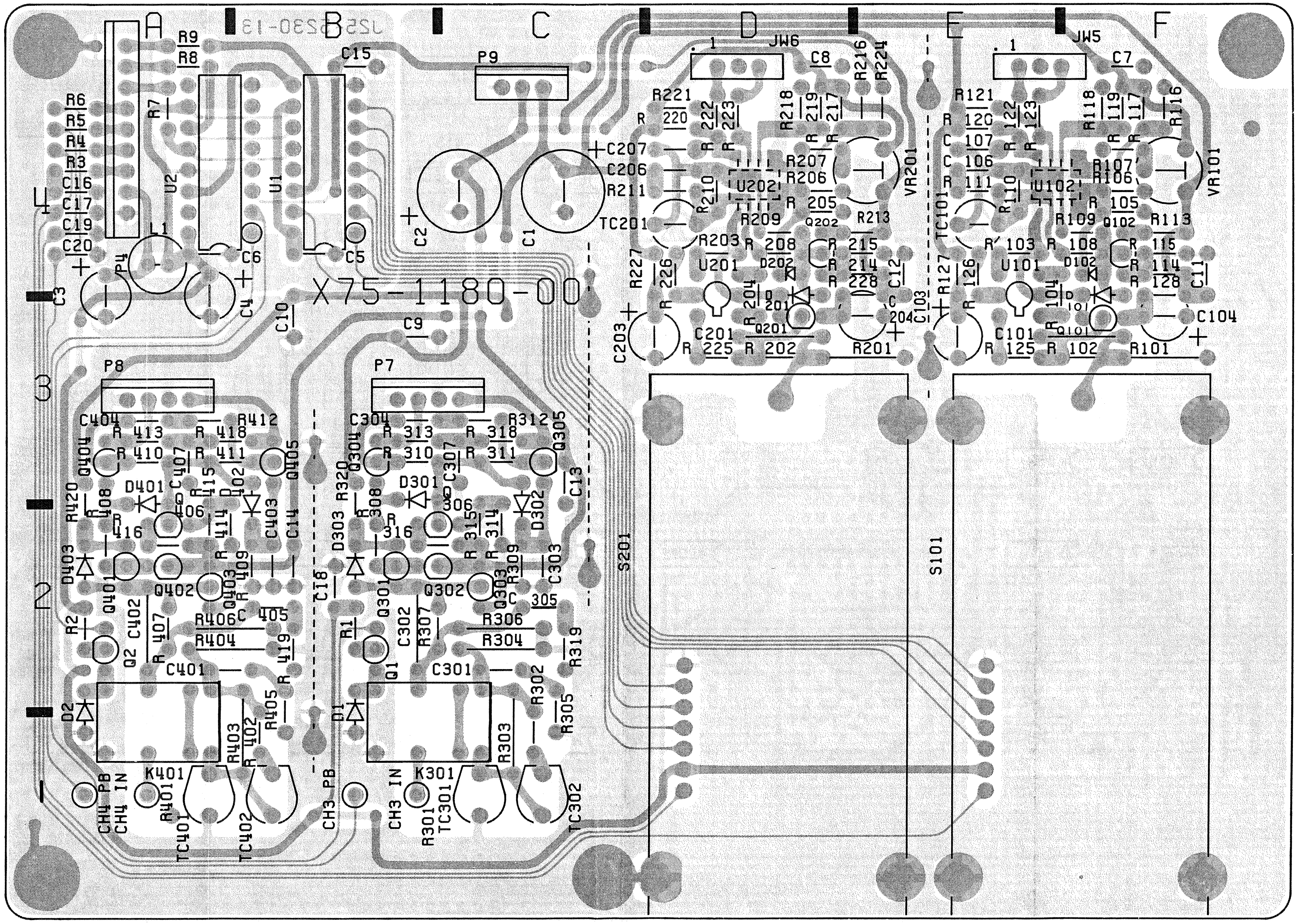
P.C BOARD

R/O UNIT (X77-1490-01) B


N
O
P
Q
R
S
T
U
V
1
2
3
4
5
6
J73-0009-12
U3
6242
U1
8464
U25
LS11
U19
4066
U38
HC564
U26
555
U20
LS107
U39
HC244
U27
LS157
U21
LS107
U14
LS04
U43
4052
U40
4052
U36
HC174
U28
LS157
U22
LS107
U15
LS30
U24
U10
HC107
U44
072
U41
4051
U34
4051
U29
HC08
U23
LS107
U16
LS374
U11
LS04
U7
LS138
U46
072
U45
072
U35
311
U30
HC7266
U24
LS30
U17
LS244
U12
LS244
U8
HC238
072
U47
U31
HC08
U18
LS244
U13
LS244
U9
HC238

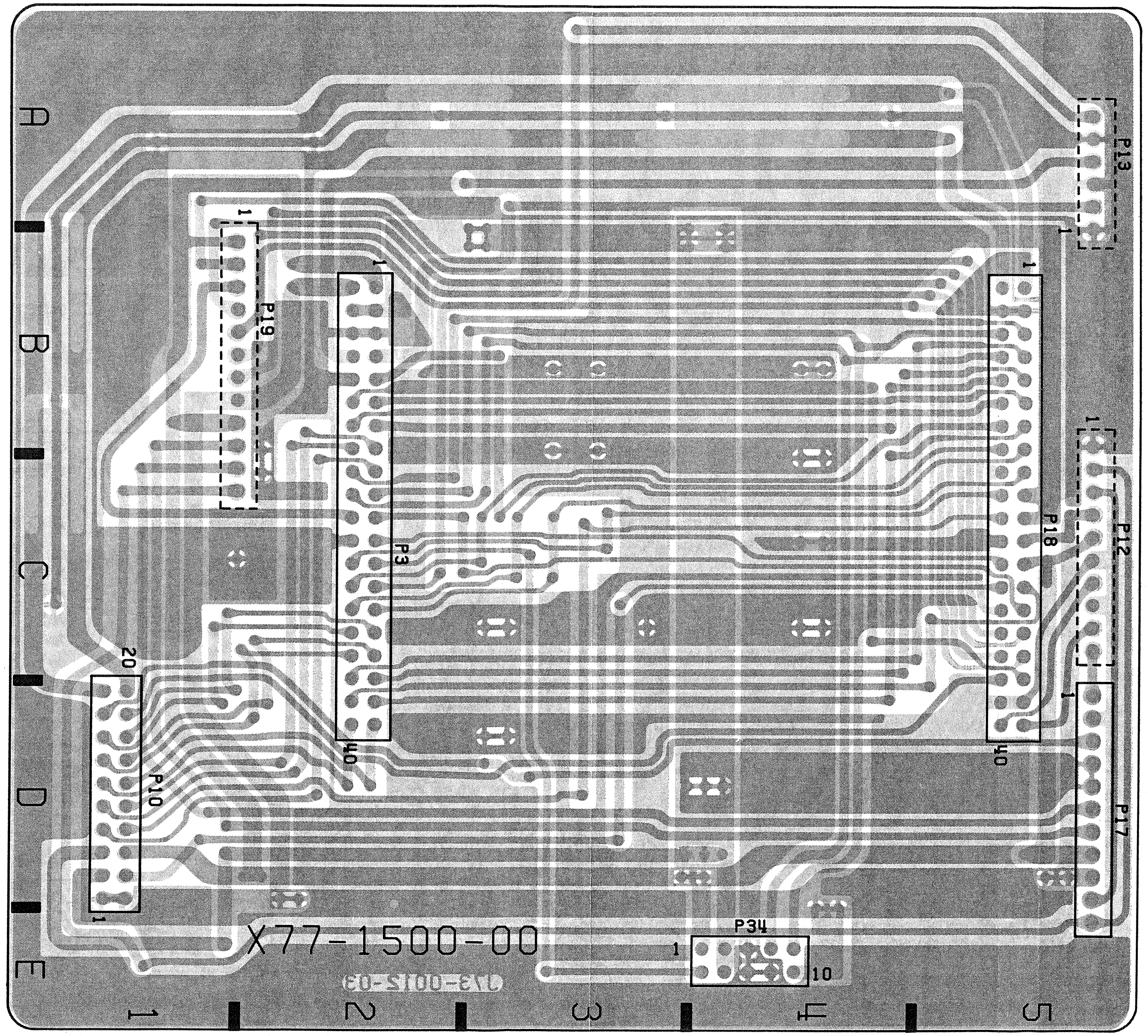
P.C BOARD

ATT UNIT (X75-1180-01)


A
B
C
D
E
F
1
2
3
4
X75-1180-00
JW6
JW5
P9
P8
P7
P4
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
U1
U2
L1
U101
U102
U201
U202
VR101
VR201
TC101
TC201
TC301
TC302
TC401
TC402
K301
K401
S101
S201
CH3 IN
CH3 PB
CH4 IN
CH4 PB
Q1
Q2
D1
D2
R1
R2
R3
R4
R5
R6
R7
R8
R9

P.C BOARD

CONNECTION UNIT (X77-1500-01)


A
B
C
D
E
1
2
3
4
5
P13
P19
P3
P18
P12
P17
P10
P34
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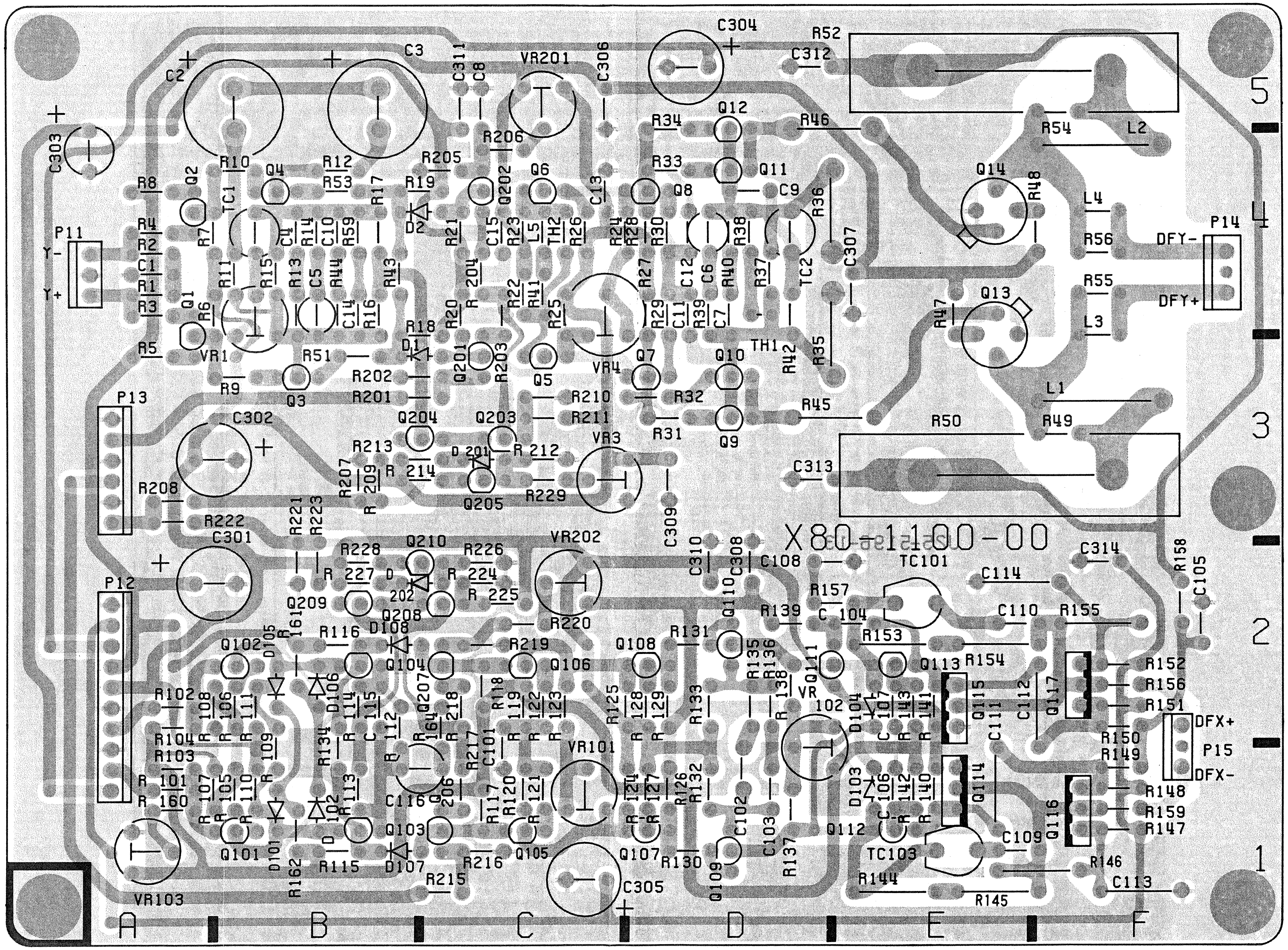
40
20
10
X77-1500-00

P.C BOARD

FINAL UNIT (X80-1100-02)


X80-1100-00
A
B
C
D
E
F
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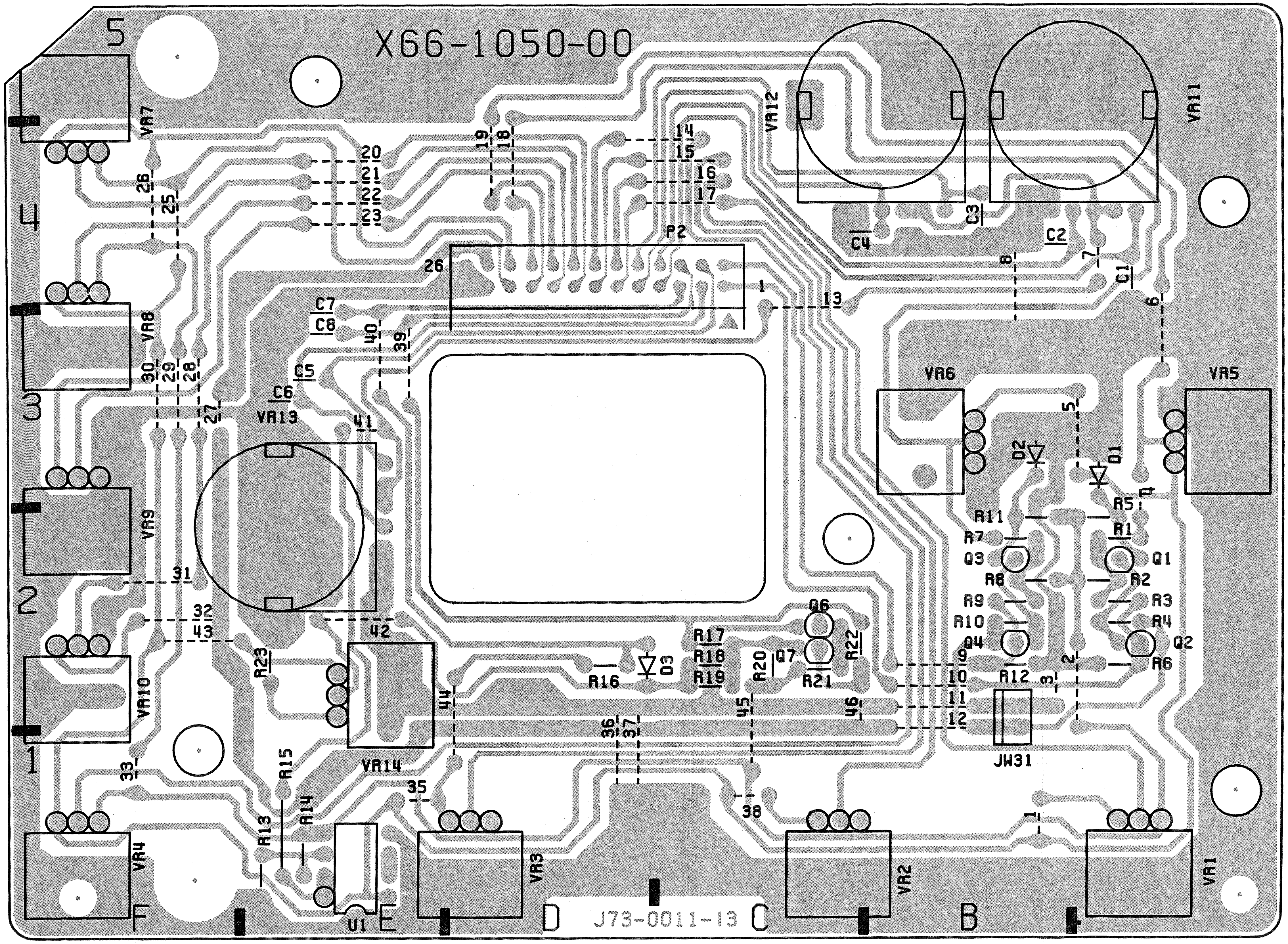
2
3
4
5
P11
Y-
Y+
P12
P13
P14
DFY-
DFY+
P15
DFX+
DFX-
C2
C3
C311
C8
VR201
C306
C304
R52
C312
C303
R10
Q2
TC1
Q4
R12
R53
R17
R205
R206
R19
Q202
Q6
C13
R34
R33
Q12
Q11
Q8
C9
R36
R46
R54
L2
Q14
R48
L4
R56
R55
Q13
R47
L3
L1
R49
R50
R45
C313
R8
R4
R2
C1
R1
R3
R5
R7
R11
R15
C4
R14
C10
R59
R13
C5
R44
R43
C14
R16
R18
D1
D2
R21
C15
R23
L5
TH2
R26
R24
R28
R30
C12
C6
R40
R38
R37
TC2
C307
R20
R204
R22
R41
R25
R27
R29
C11
R39
C7
TH1
R42
R35
Q1
R6
VR1
R51
R9
Q3
R202
R201
Q201
R203
Q5
VR4
Q7
Q10
R32
Q9
R210
R211
R31
C302
Q204
Q203
R213
D201
R212
VR3
R207
R209
R214
Q205
R229
C309
R208
R222
R221
R223
C301
Q210
R228
R227
D202
R226
R224
R225
VR202
Q209
Q208
R220
C310
C308
C108
TC101
C314
C114
R158
C105
R157
R139
C104
C110
R155
R153
R154
Q113
R152
R156
R151
R150
R149
R148
R159
R147
R146
C113
R145
R144
TC103
C109
Q116
Q117
Q115
Q114
C112
C111
Q102
D105
R161
R116
D108
Q104
R219
Q106
Q108
R131
Q110
R135
R136
Q111
R102
R108
R106
R111
D106
R114
C115
Q207
D164
R218
R118
R119
R122
R123
R125
R128
R129
R133
R138
VR102
D104
C107
R143
R141
R104
R103
R109
R134
R112
R217
C101
R101
R160
R107
R105
R110
R113
C116
Q206
R117
R120
R121
VR101
R124
R127
R126
R132
C102
C103
R137
D103
C106
R142
R140
Q112
Q101
D101
D102
Q103
Q105
Q107
R130
Q109
R162
R115
D107
R216
R215
C305
VR103

P.C BOARD

PANEL UNIT (X66-1050-01)

Pattern side view


X66-1050-00
J73-0011-13
P2
VR1
VR2
VR3
VR4
VR5
VR6
VR7
VR8
VR9
VR10
VR11
VR12
VR13
VR14
C1
C2
C3
C4
C5
C6
C7
C8
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
Q1
Q2
Q3
Q4
Q6
Q7
D1
D2
D3
U1
JW31
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
25
26
27
28
29
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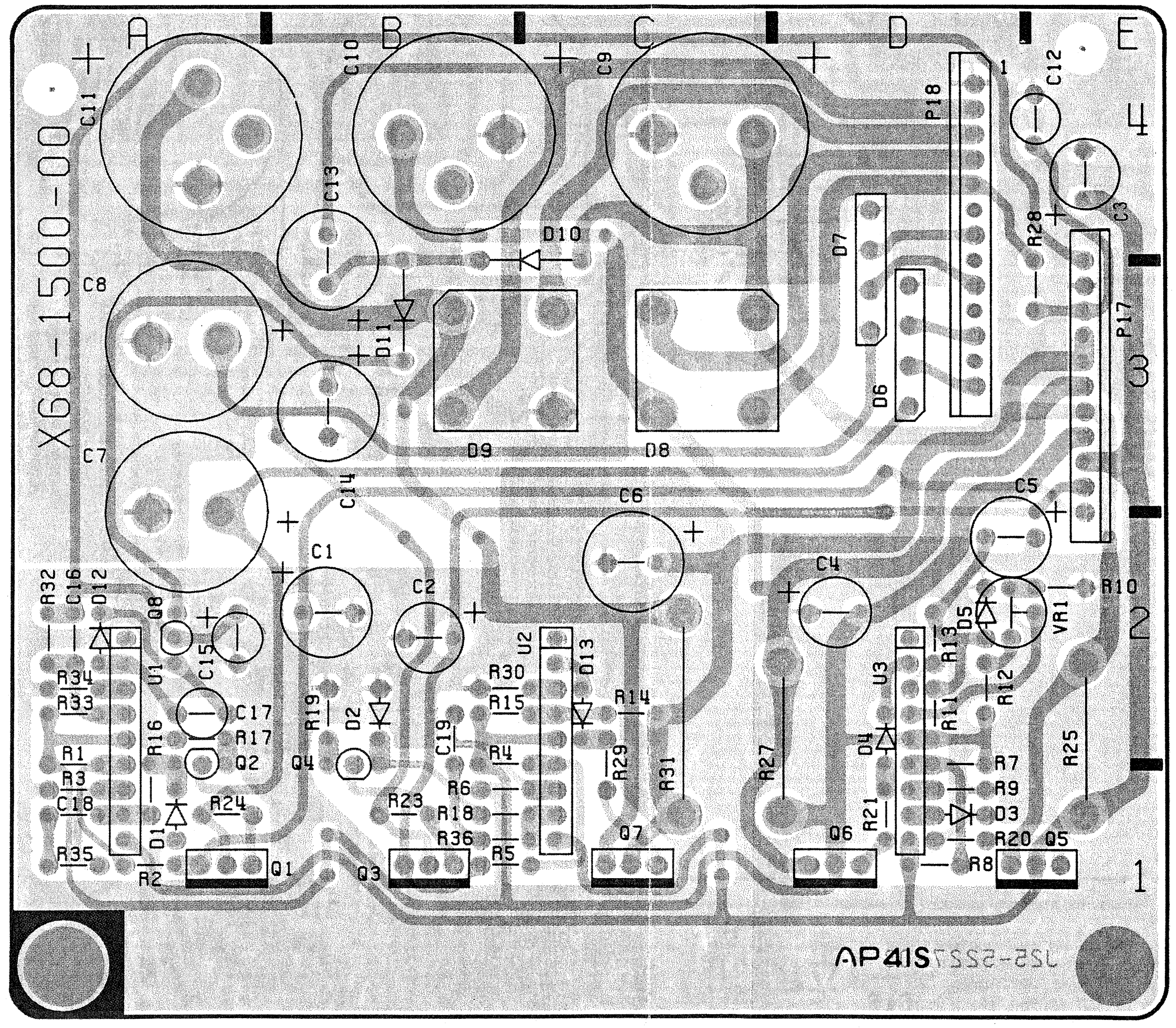
31
32
33
35
36
37
38
39
40
41
42
43
44
45
46
B
C
D
E
F

P.C BOARD

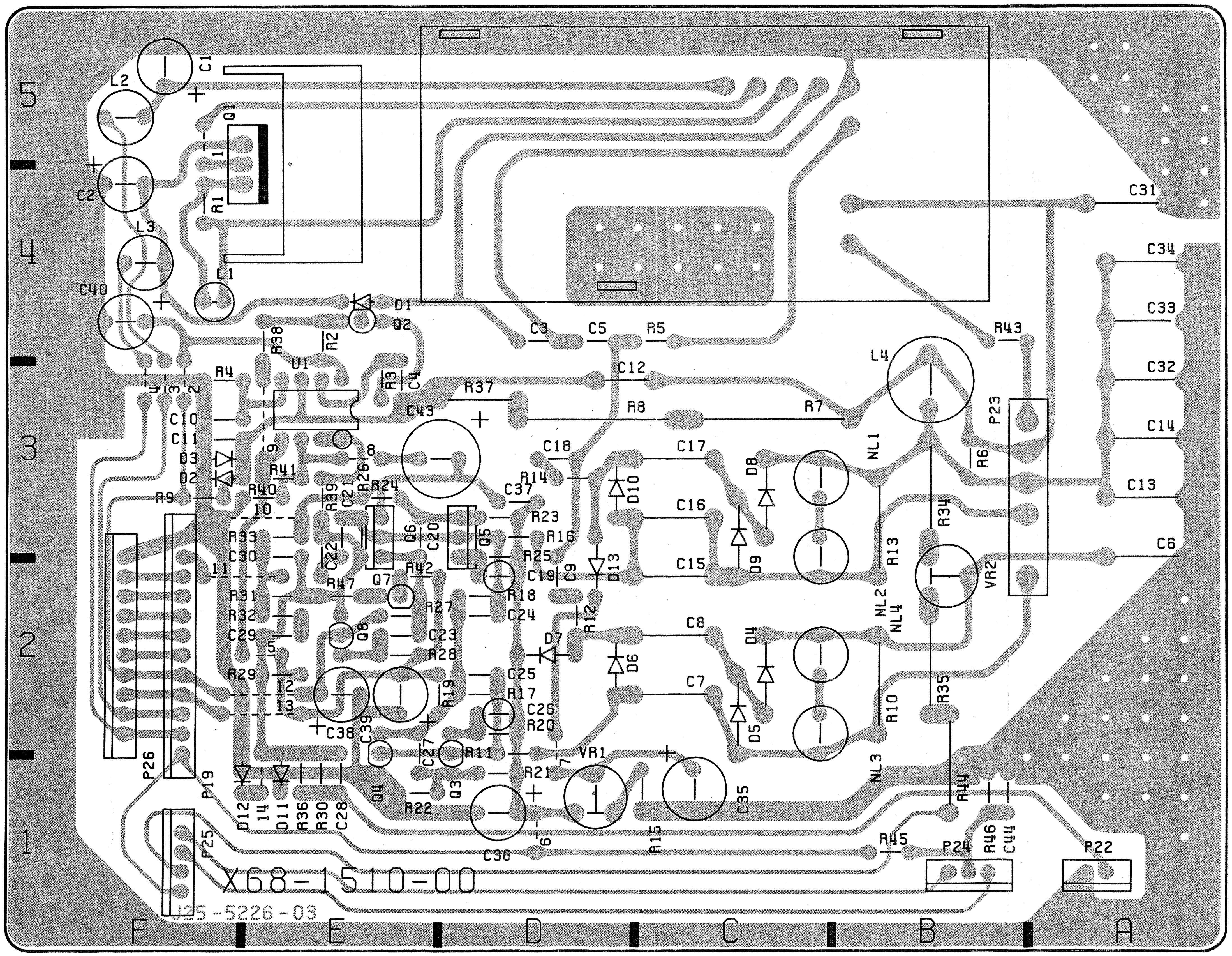
POWER SUPPLY UNIT (X68-1500-01)


A
B
C
D
E
X68-1500-00
C11
C10
C9
C12
4
C13
C3
D10
P18
D7
R28
C8
D11
P17
3
D6
C7
D9
D8
C14
C6
C5
C1
C2
C4
R10
R32
C16
D12
Q8
C15
U1
U2
D13
U3
R13
D5
VR1
2
R34
R33
C17
R17
Q2
R16
R19
D2
C19
R30
R15
R14
R12
R11
R25
R1
R3
C18
R35
R2
D1
R24
Q1
Q4
Q3
R23
R4
R6
R18
R36
R5
R29
R31
Q7
R27
D4
R7
R9
D3
R20
Q5
R21
Q6
R8
1
AP41S

P.C BOARD

HIGH VOLTAGE UNIT (X68-1510-02)

Pattern side view

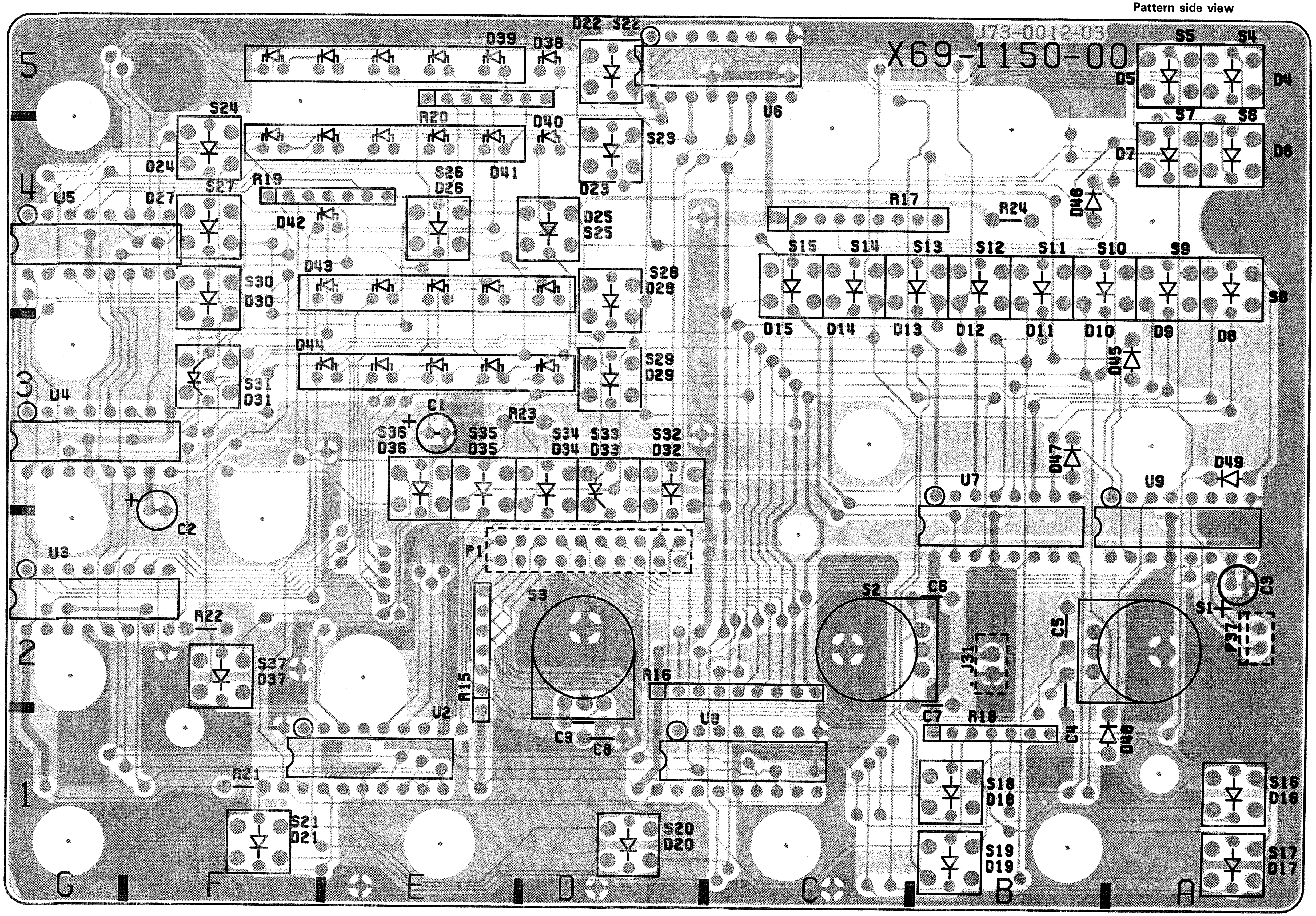


5
4
3
2
1
F
E
D
C
B
A
C1
L2
Q1
C2
R1
L3
L1
C40
D1
Q2
R38
R2
U1
R4
R3
C4
C10
C11
D3
D2
R9
R41
R40
10
R39
C21
R26
R24
8
9
R37
C43
C3
C5
R5
C12
R8
R7
L4
R43
P23
C31
C34
C33
C32
C14
C13
C6
R33
C30
11
C22
Q6
C20
Q5
R47
Q7
R42
R31
R32
C29
R29
12
13
Q8
R27
C23
R28
R19
C38
C39
C27
R11
Q4
Q3
R22
D12
14
D11
R36
R30
C28
P26
P19
P25
C18
R14
C37
R23
R16
R25
C19
C9
R18
C24
R12
D7
C25
R17
C26
R20
R21
VR1
C35
C36
R15
7
6
D10
D13
C17
C16
C15
D8
D9
NL1
R6
R34
R13
VR2
NL2
NL4
C8
C7
D6
D4
D5
R10
R35
NL3
R44
R45
P24
R46
C44
P22
X68-1510-00
J25-5226-03

P.C BOARD

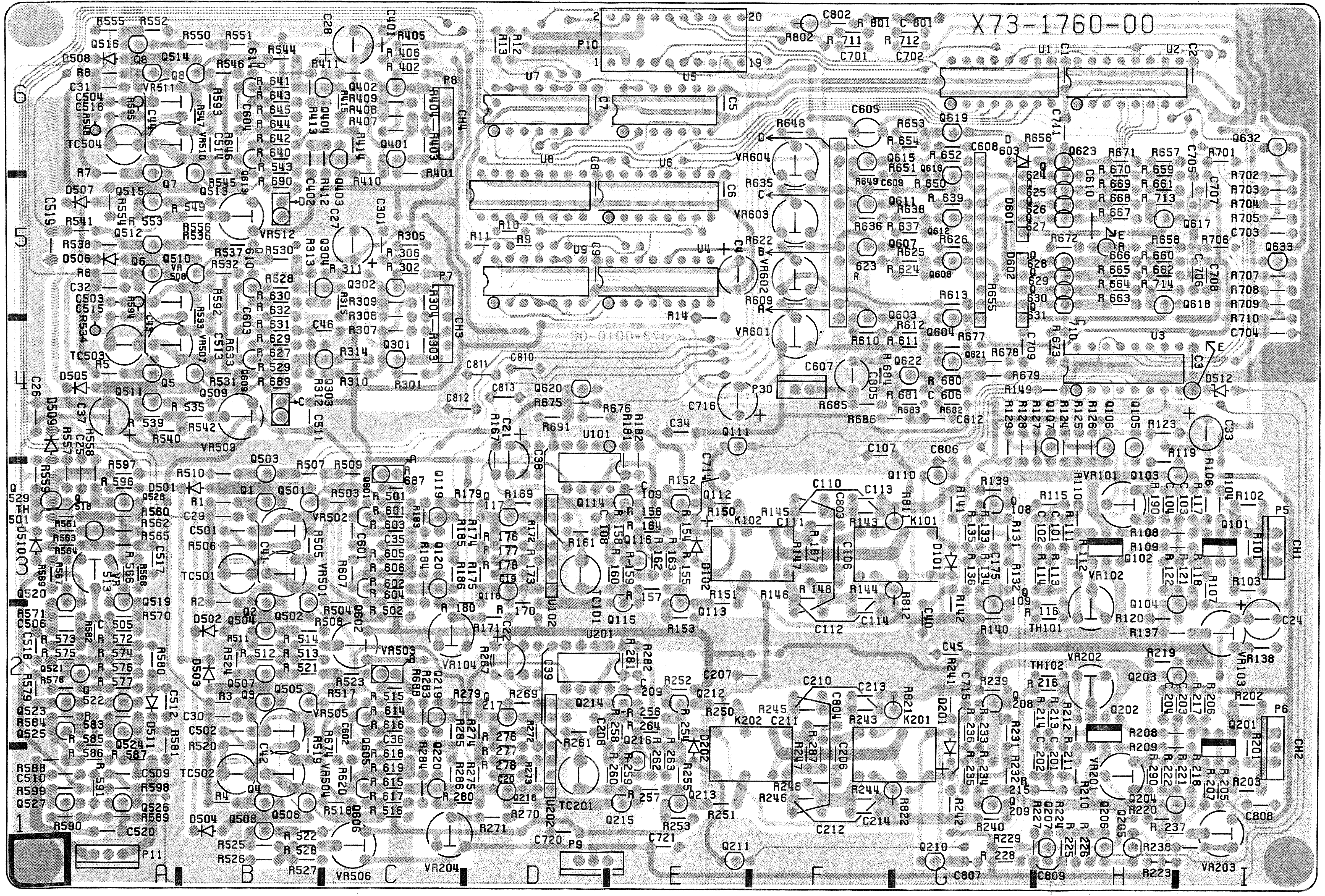
SWITCH UNIT (X69-1150-02)

Pattern side view


X69-1150-00
J73-0012-03
S22
D22
D39
D38
D40
D41
R20
U6
S23
D23
S24
D24
S27
D27
R19
S26
D26
D42
D25
S25
U5
S30
D30
D43
S28
D28
D44
S31
D31
S29
D29
U4
C1
R23
S36
D36
S35
D35
S34
D34
S33
D33
S32
D32
C2
U3
P1
R22
S37
D37
U2
R15
S3
C9
C8
R21
S21
D21
S20
D20
R16
U8
S5
S4
D5
D4
S7
S6
D7
D6
D46
R17
R24
S15
S14
S13
S12
S11
S10
S9
S8
D15
D14
D13
D12
D11
D10
D9
D8
D45
D47
D49
U7
U9
S2
C6
C3
S1
C5
J31
P37
C7
R18
C4
D48
S18
D18
S19
D19
S16
D16
S17
D17
5
4
3
2
1
G
F
E
D
C
B
A

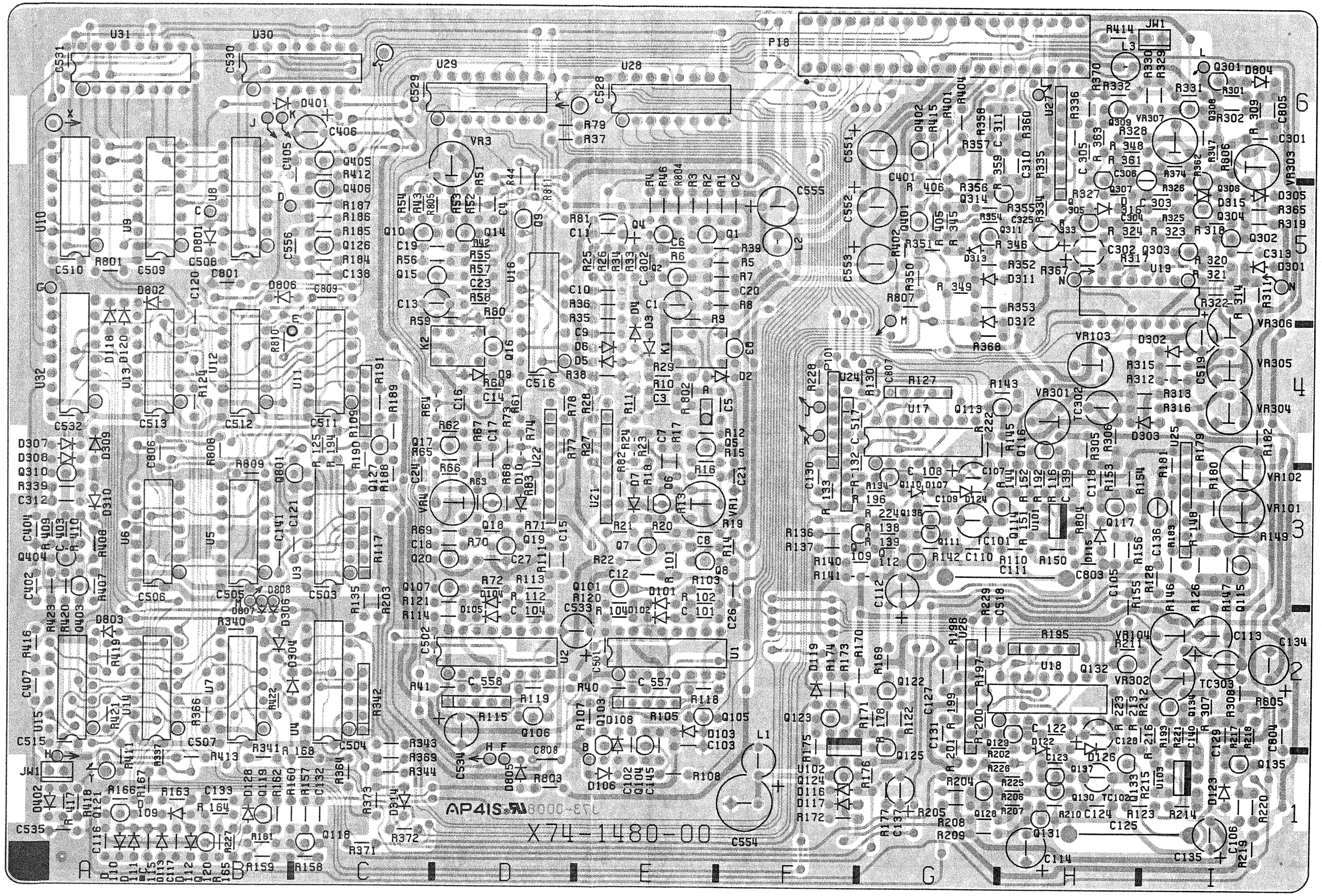
P.C BOARD

VERTICAL PREAMP UNIT (X73-1760-01)


X73-1760-00
CH1
CH2
CH3
CH4
P5
P6
P7
P8
P9
P10
P11
A
B
C
D
E
F
G
H
I
1
2
3
4
5
6

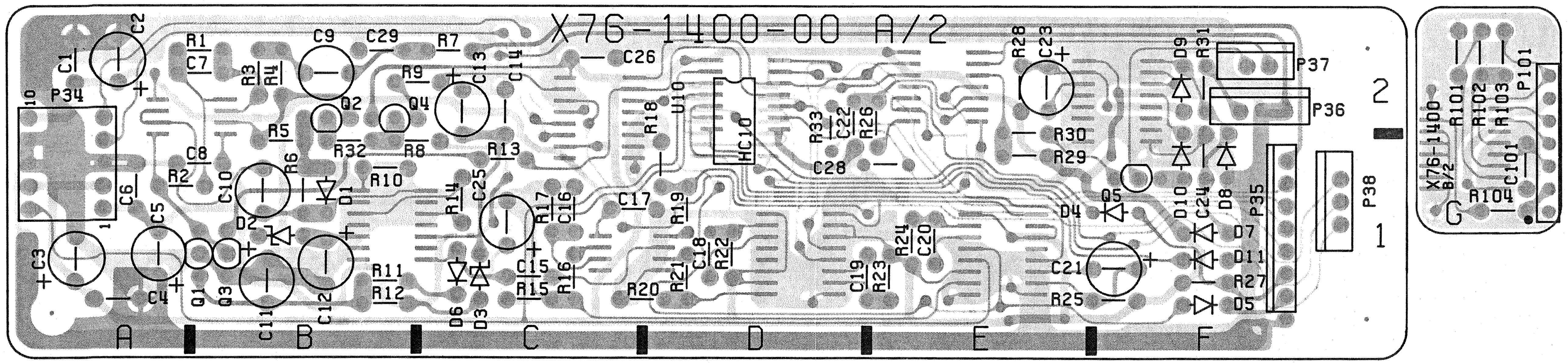
P.C BOARD

HORIZONTAL UNIT (X74-1480-02)


U31
U30
U29
U28
P18
U10
U9
U8
U32
U13
U12
U11
U6
U5
U3
U15
U14
U7
U4
U16
U22
U21
U2
U1
U27
U19
U24
U17
U25
U26
U18
VR1
VR3
VR4
VR101
VR102
VR103
VR104
VR301
VR302
VR303
VR304
VR305
VR306
VR307
K1
K2
L1
L2
L3
JW1
C554
C555
AP41S
J73-0008
X74-1480-00
A
B
C
D
E
F
G
H
I
1
2
3
4
5
6

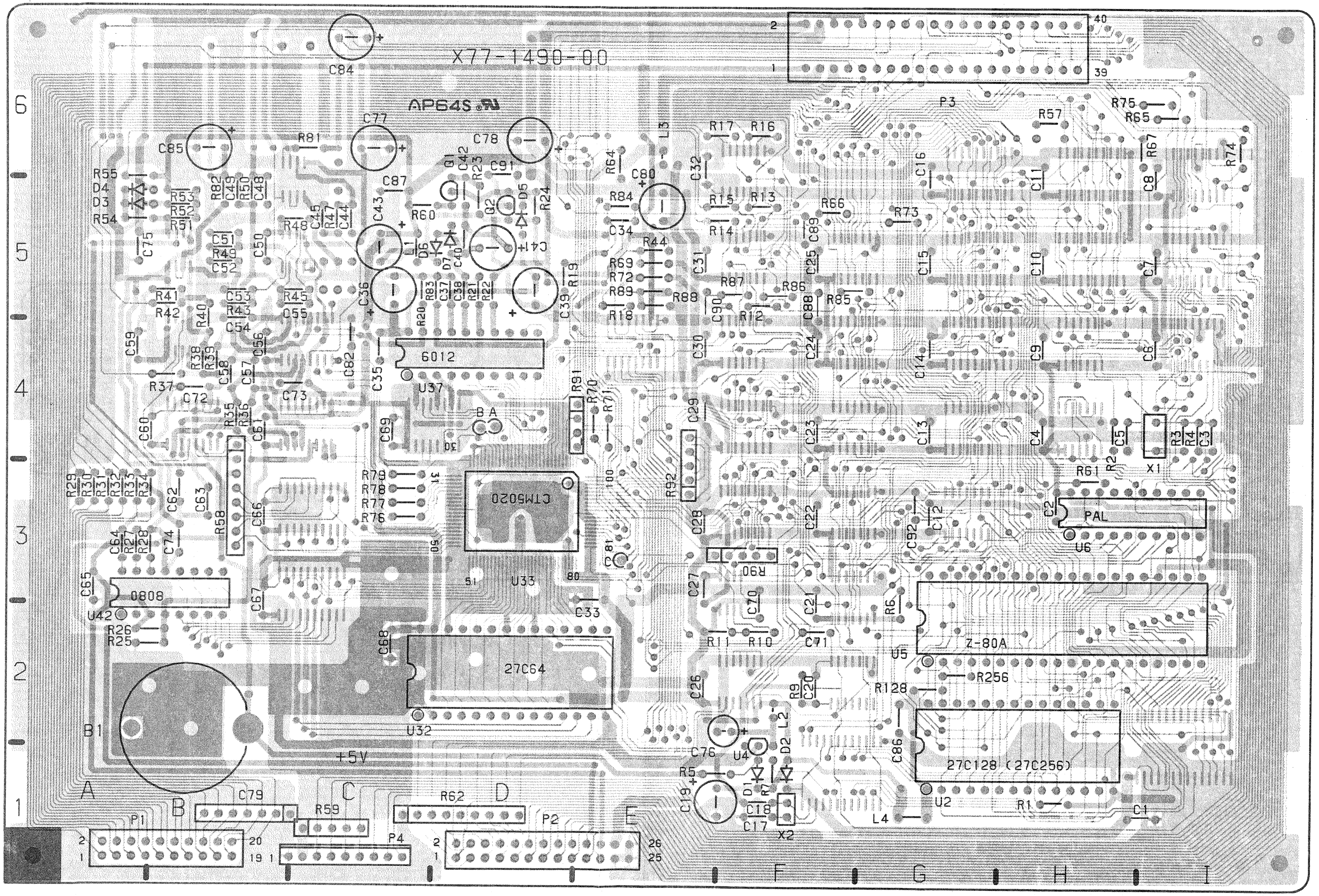
P.C BOARD

LINE COUNTER UNIT (X76-1400-00)


X76-1400-00 A/2
X76-1400 B/2
A
B
C
D
E
F
G
1
2
10
1
P34
P35
P36
P37
P38
P101
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22
C23
C24
C25
C26
C28
C29
C101
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R101
R102
R103
R104
Q1
Q2
Q3
Q4
Q5
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
U10
HC10

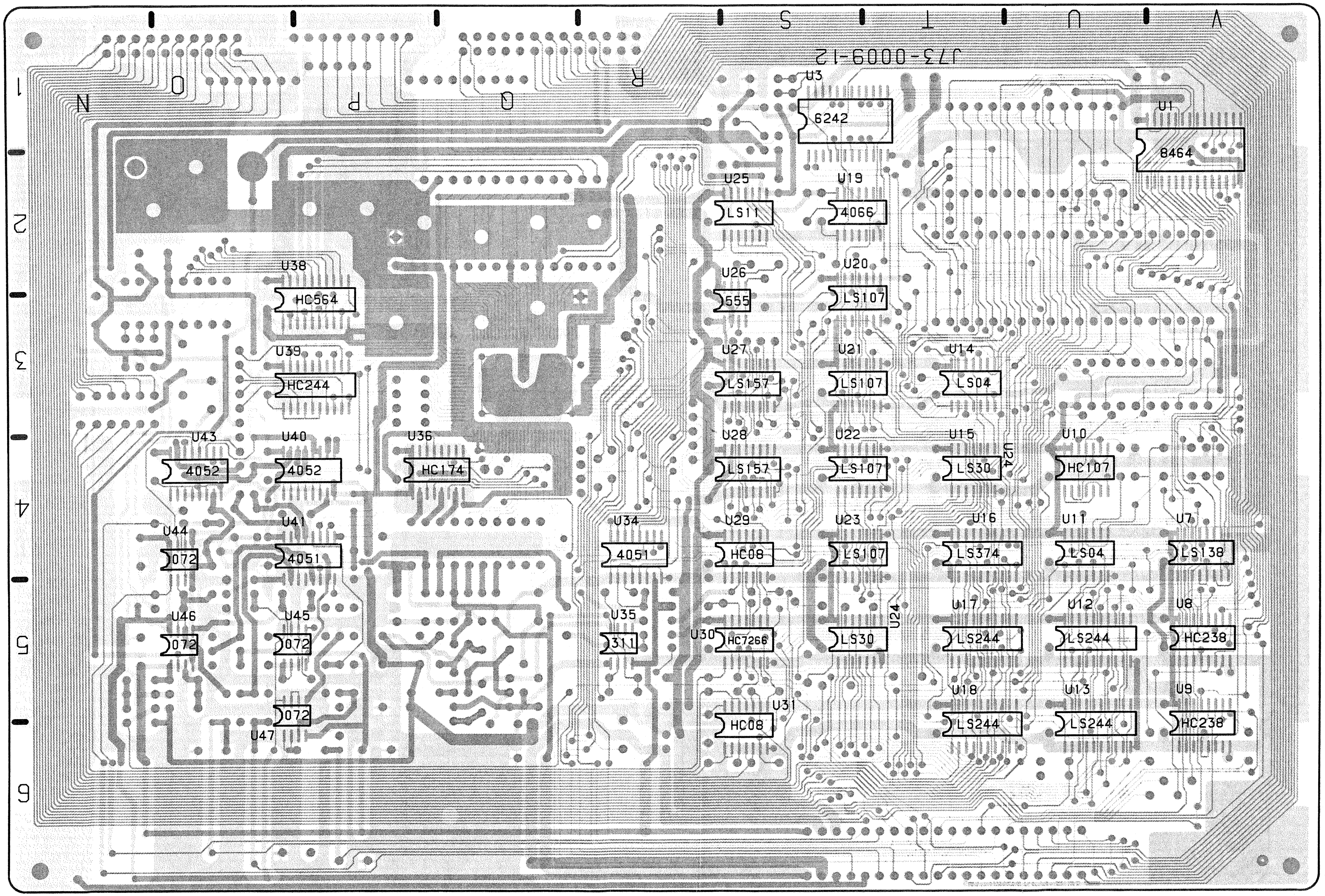
P.C BOARD

R/O UNIT (X77-1490-01) A


X77-1490-00
AP64S
P3
2
40
1
39
C84
C77
C78
C85
R81
R75
R65
R57
R17
R16
L3
R67
R74
R55
D4
D3
R54
R53
R52
R51
R82
C49
R50
C48
C87
Q1
C42
R23
C91
R64
C32
C16
C11
C8
C75
C45
R47
C44
R48
C43
R60
Q2
D5
R24
R84
C80
R15
R13
R66
R73
C51
R49
C52
C50
L1
D6
D7
C40
C41
C34
R14
C89
R44
R69
R72
R89
R18
R88
C31
R87
R86
R85
C25
C15
C10
C7
R41
R42
R40
C53
R43
C54
C56
R45
C55
C36
R83
C37
C38
R21
R22
R20
C39
R19
C90
R12
C88
C59
R38
R39
C58
C57
C82
C35
6012
U37
C30
C24
C14
C9
C6
R37
C72
C73
R35
R36
C61
C60
C69
B A
30
R91
R70
R71
C29
C23
C13
C4
C5
R2
R3
R4
C3
X1
R61
R29
R30
R31
R32
R33
R34
C62
C63
R58
C66
R79
R78
R77
R76
31
CTM5020
100
R92
C28
C22
C12
C2
PAL
U6
C92
C64
R27
R28
C74
50
C81
R90
C65
0808
U42
C67
51
U33
80
C33
C27
C70
C21
R6
Z-80A
U5
R26
R25
C68
27C64
U32
R11
R10
C71
R256
R128
C26
R9
C20
B1
L2
D2
C76
U4
C86
27C128 (27C256)
U2
+5V
R5
D1
R7
C19
C18
C17
X2
R1
C1
L4
C79
R59
R62
P1
P4
P2
20
19
26
25
A
B
C
D
E
F
G
H
I
1
2
3
4
5
6

P.C BOARD

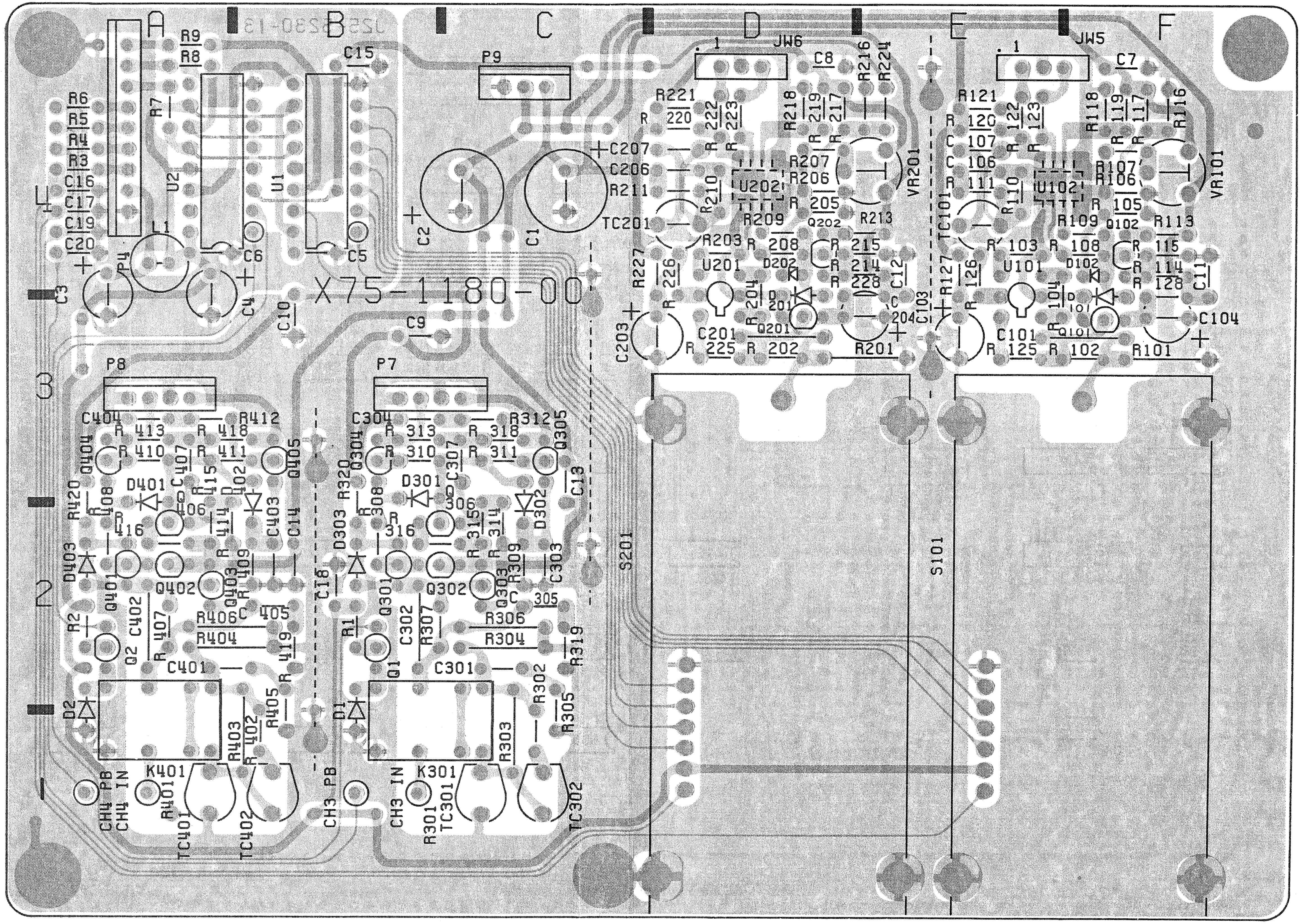
R/O UNIT (X77-1490-01) B



J73-0009-12
N
O
P
Q
R
S
T
U
V
1
2
3
4
5
6
U1 8464
U3 6242
U25 LS11
U19 4066
U26 555
U20 LS107
U27 LS157
U21 LS107
U14 LS04
U28 LS157
U22 LS107
U15 LS30
U24
U10 HC107
U29 HC08
U23 LS107
U16 LS374
U11 LS04
U7 LS138
U30 HC7266
U24 LS30
U17 LS244
U12 LS244
U8 HC238
U31 HC08
U18 LS244
U13 LS244
U9 HC238
U38 HC564
U39 HC244
U43 4052
U40 4052
U36 HC174
U44 072
U41 4051
U34 4051
U46 072
U45 072
U35 311
U47 072

P.C BOARD

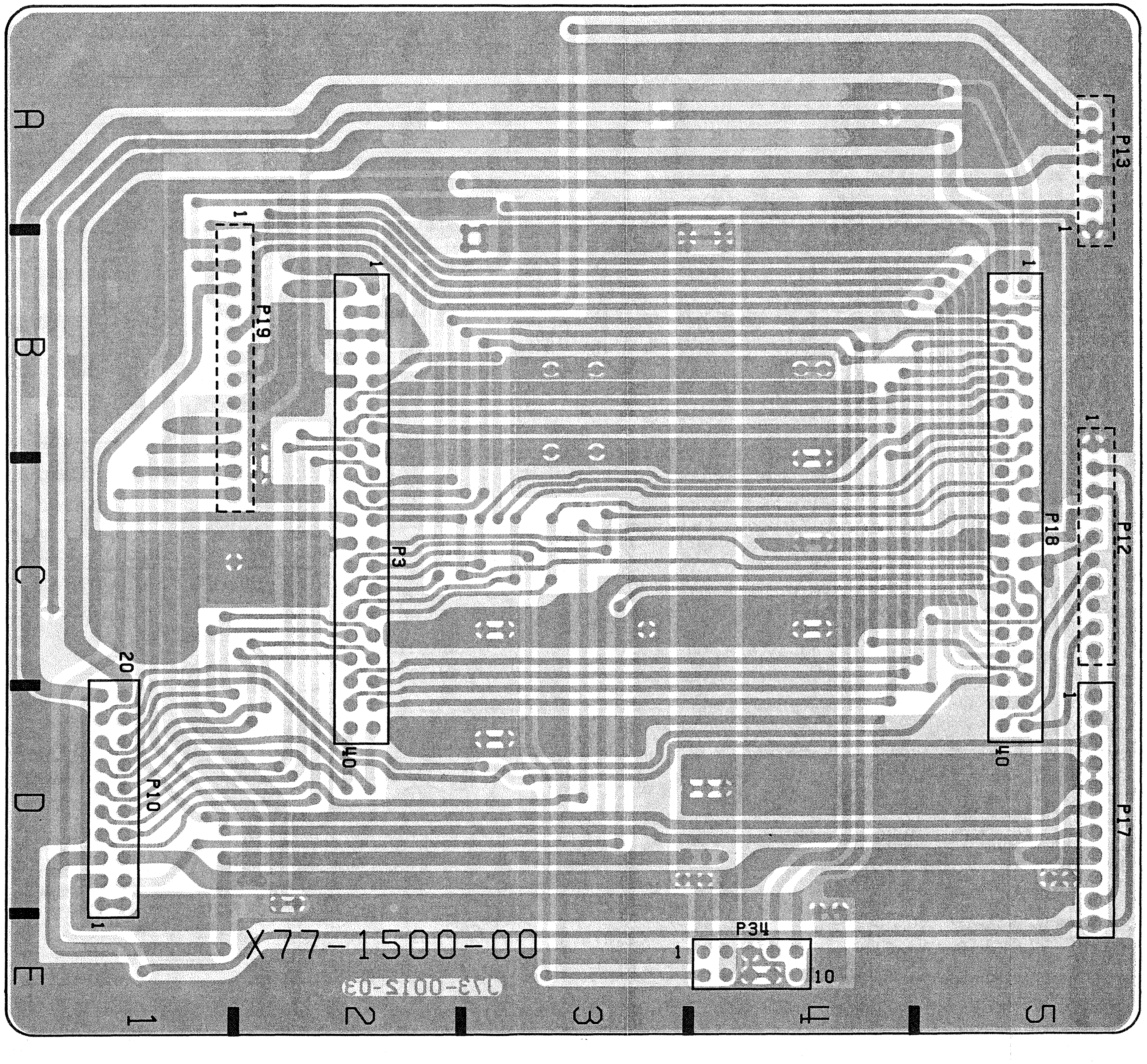
ATT UNIT (X75-1180-01)



A
B
C
D
E
F
1
2
3
4
X75-1180-00
P7
P8
P9
JW5
JW6
U1
U2
U101
U201
U102
U202
VR101
VR201
S101
S201
K301
K401
L1
C1
C2
C3
C4
CH3 IN
CH3 PB
CH4 IN
CH4 PB
TC101
TC201
TC301
TC302
TC401
TC402

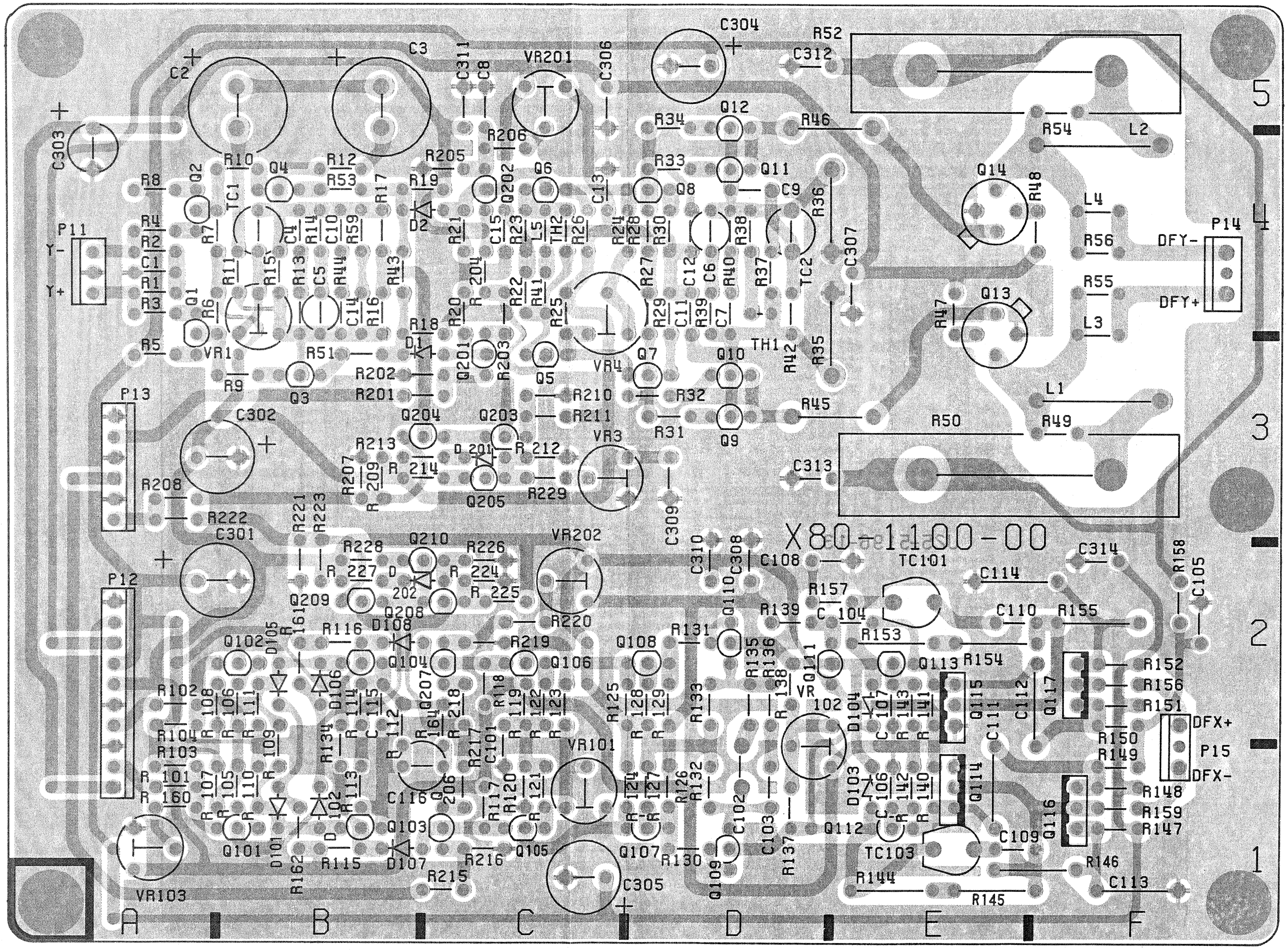
P.C BOARD

CONNECTION UNIT (X77-1500-01)


A
B
C
D
E
1
2
3
4
5
P13
1
P19
1
P3
1
40
P18
1
40
P12
1
P17
1
P10
20
1
P34
1
10
X77-1500-00

P.C BOARD

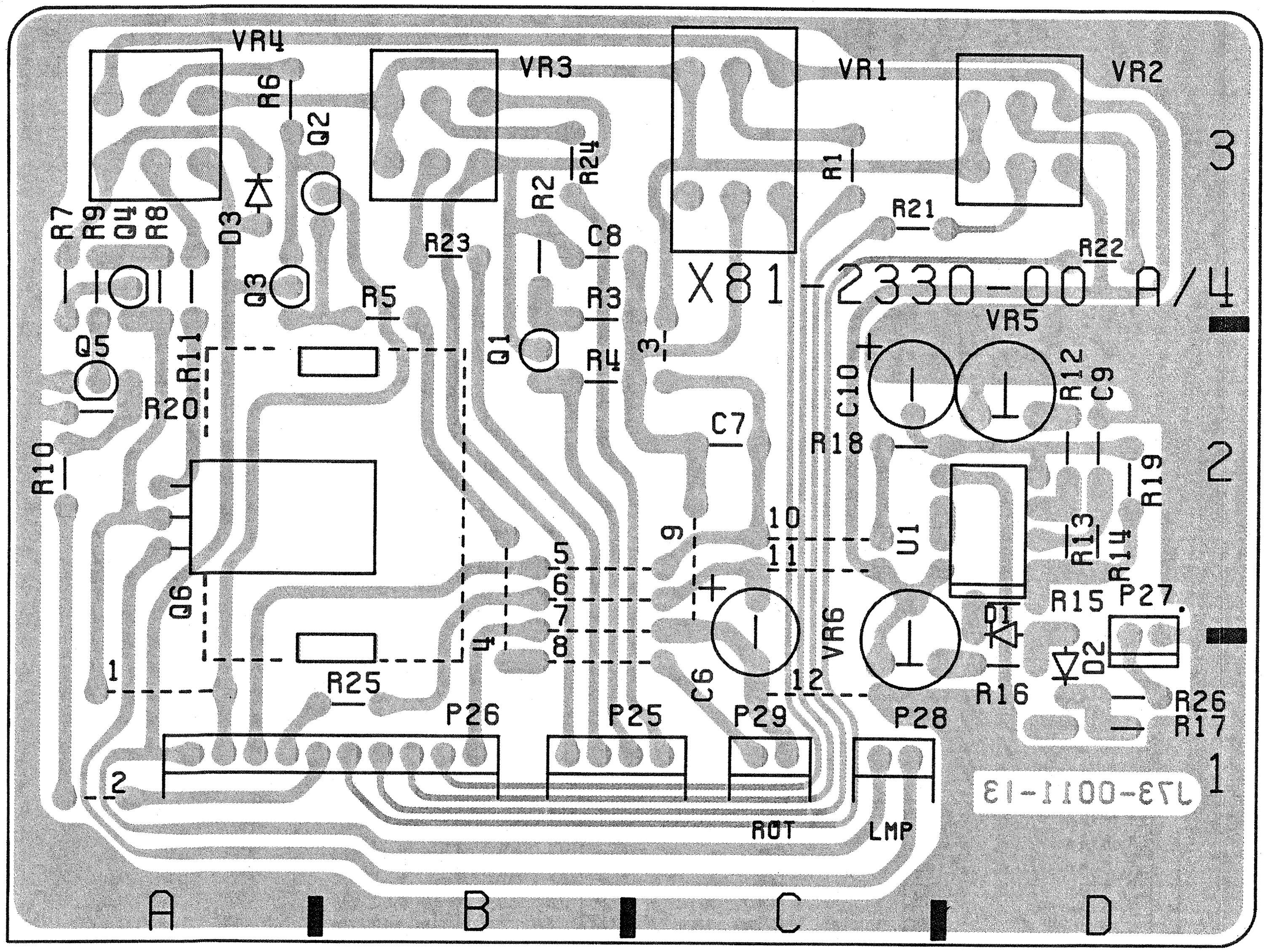
FINAL UNIT (X80-1100-02)



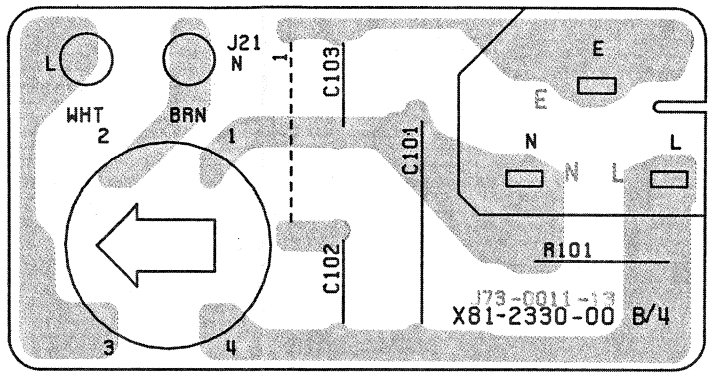
C304
R52
C312
C3
C311
C8
VR201
C306
C2
5
4
3
2
1
A
B
C
D
E
F
C303
R34
Q12
R46
R54
L2
R206
R10
Q4
R12
R205
R33
Q11
Q14
R8
Q2
TC1
R53
R17
R19
Q6
Q202
C13
Q8
C9
R36
R48
P11
Y-
Y+
R4
R2
C1
R1
R3
R7
C4
R14
C10
R59
D2
R21
C15
R23
L5
TH2
R26
R24
R28
R30
R38
L4
R56
DFY-
P14
R11
R15
R13
C5
R44
R43
R204
R22
R41
R27
C12
C6
R40
R37
TC2
C307
R55
DFY+
Q1
R6
C14
R16
R18
R20
R25
R29
C11
R39
C7
R47
Q13
L3
R5
VR1
D1
R51
R202
Q201
R203
VR4
Q7
Q10
TH1
R42
R35
R9
Q3
R201
Q5
R210
R32
L1
P13
C302
Q204
Q203
R211
R45
R50
R49
R213
D201
R212
VR3
R31
Q9
R207
R209
R214
C313
R208
Q205
R229
C309
R222
R221
R223
C301
R228
Q210
R226
VR202
C310
C308
C108
X80-1100-00
TC101
C314
R158
C105
P12
R227
D202
R224
R225
C114
Q209
Q208
R220
Q110
R157
C104
R139
C110
R155
R116
D108
R161
D105
R219
R131
R153
Q102
Q104
Q106
Q108
R135
R136
Q111
Q113
R154
R152
R156
R151
R102
R108
R106
R111
D106
R114
C115
Q207
R218
R118
R119
R122
R123
R125
R128
R129
R133
R138
VR102
C107
R143
R141
Q115
C112
Q117
D104
R104
R103
R101
R160
R109
R134
R112
R164
R217
C101
VR101
C111
R150
R149
DFX+
P15
DFX-
R107
R105
R110
R113
D102
C116
Q206
R117
R120
R121
R124
R127
R126
R132
C102
C103
D103
C106
R142
R140
Q114
Q116
R148
R159
R147
VR103
Q101
D101
R162
R115
D107
Q103
R216
Q105
Q107
R130
Q109
R137
Q112
TC103
C109
R146
R215
C305
R144
R145
C113

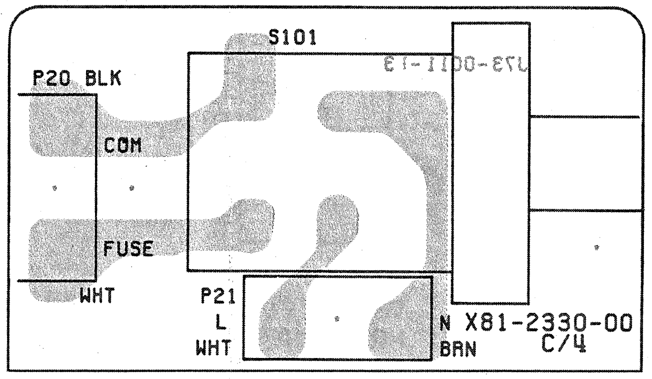
P.C BOARD

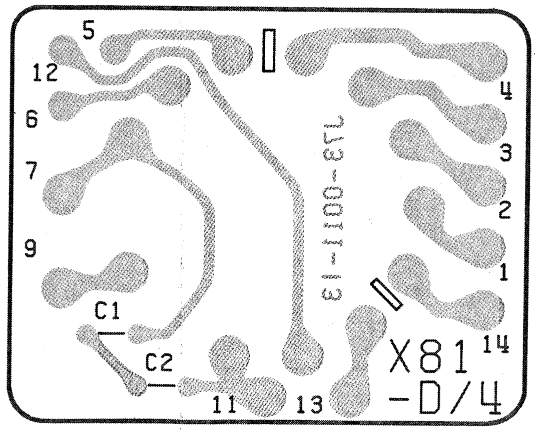
VOLUME UNIT (X81-2330-02)


VR4
VR3
VR1
VR2
VR5
VR6
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
Q1
Q2
Q3
Q4
Q5
Q6
D1
D2
D3
C6
C7
C8
C9
C10
U1
P25
P26
P27
P28
P29
ROT
LMP
X81-2330-00 A/4
J73-0011-13
1
2
3
4
5
6
7
8
9
10
11
12
A
B
C
D

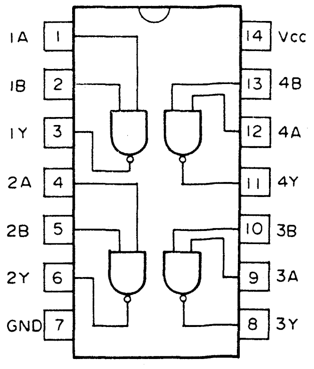
Pattern side view


L
J21
N
WHT
2
BRN
1
C103
C101
C102
E
N
L
R101
J73-0011-13
X81-2330-00 B/4
3
4

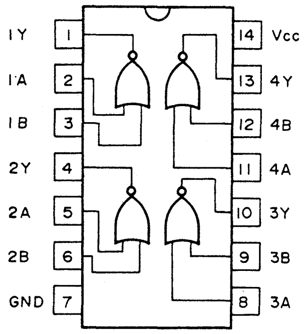

S101
P20 BLK
COM
FUSE
WHT
P21
L
WHT
N
BRN
X81-2330-00
C/4
J73-0011-13


5
12
6
7
9
C1
C2
11
13
4
3
2
1
14
J73-0011-13
X81
-D/4

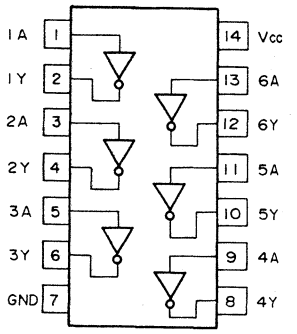
SEMICONDUCTORS


1A 1
1B 2
1Y 3
2A 4
2B 5
2Y 6
GND 7
14 Vcc
13 4B
12 4A
11 4Y
10 3B
9 3A
8 3Y

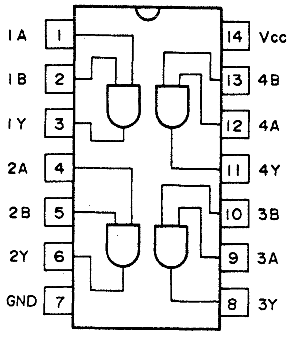
SN74ALS00AN
HD74HC00FP


1Y 1
1A 2
1B 3
2Y 4
2A 5
2B 6
GND 7
14 Vcc
13 4Y
12 4B
11 4A
10 3Y
9 3B
8 3A

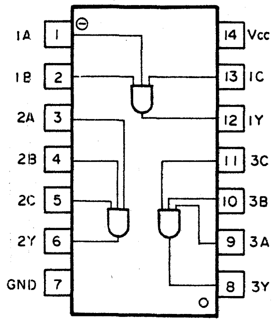
SN74ALS02N


1A 1
1Y 2
2A 3
2Y 4
3A 5
3Y 6
GND 7
14 Vcc
13 6A
12 6Y
11 5A
10 5Y
9 4A
8 4Y

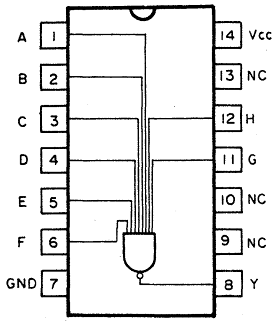
HD74LS04FP


1A 1
1B 2
1Y 3
2A 4
2B 5
2Y 6
GND 7
14 Vcc
13 4B
12 4A
11 4Y
10 3B
9 3A
8 3Y

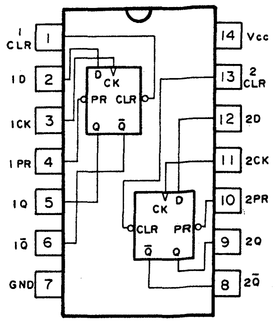
SN74ALS08N
HD74HC08FP


1A 1
1B 2
2A 3
2B 4
2C 5
2Y 6
GND 7
14 Vcc
13 1C
12 1Y
11 3C
10 3B
9 3A
8 3Y

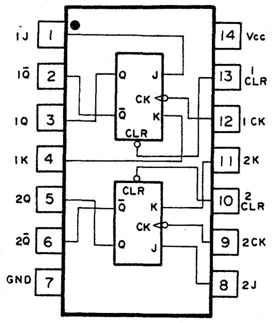
HD74LS11FP


A 1
B 2
C 3
D 4
E 5
F 6
GND 7
14 Vcc
13 NC
12 H
11 G
10 NC
9 NC
8 Y

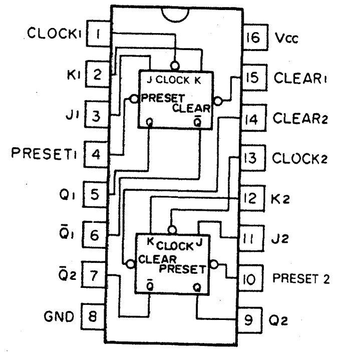
HD74LS30FP


1CLR 1
1D 2
1CK 3
1PR 4
1Q 5
1Q̄ 6
GND 7
14 Vcc
13 2CLR
12 2D
11 2CK
10 2PR
9 2Q
8 2Q̄
D
CK
PR
CLR
Q
Q̄

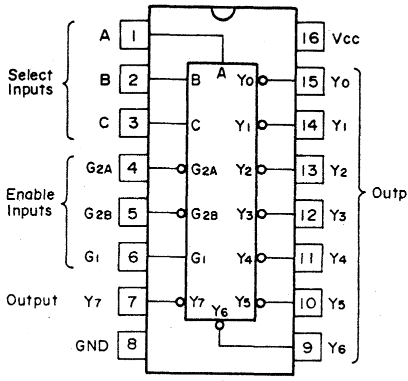
SN74ALS74AN


1J 1
1Q̄ 2
1Q 3
1K 4
2Q 5
2Q̄ 6
GND 7
14 Vcc
13 1CLR
12 1CK
11 2K
10 2CLR
9 2CK
8 2J
Q
J
CK
K
CLR

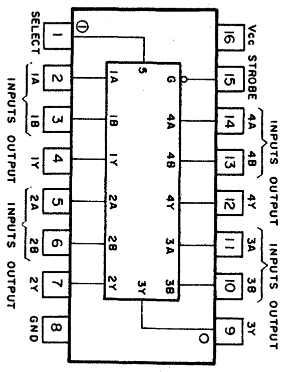
HD74LS107AFP
HD74HC107FP


CLOCK1 1
K1 2
J1 3
PRESET1 4
Q1 5
Q̄1 6
Q̄2 7
GND 8
16 Vcc
15 CLEAR1
14 CLEAR2
13 CLOCK2
12 K2
11 J2
10 PRESET 2
9 Q2
J CLOCK K
PRESET
CLEAR
Q
Q̄

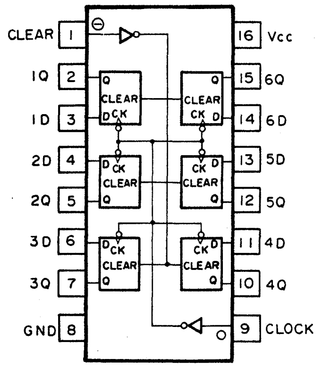
SN74ALS112AN


Select Inputs
Enable Inputs
Output
A 1
B 2
C 3
G2A 4
G2B 5
G1 6
Y7 7
GND 8
16 Vcc
15 Y0
14 Y1
13 Y2
12 Y3
11 Y4
10 Y5
9 Y6
Outputs

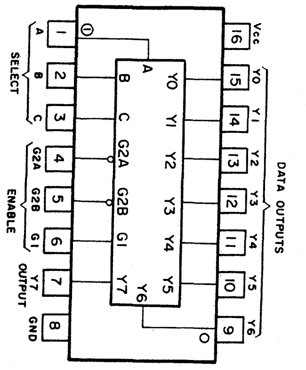
HD74LS138FP


SELECT 1
1A 2
1B 3
1Y 4
2A 5
2B 6
2Y 7
GND 8
16 Vcc
15 STROBE
14 4A
13 4B
12 4Y
11 3A
10 3B
9 3Y
INPUTS
OUTPUT

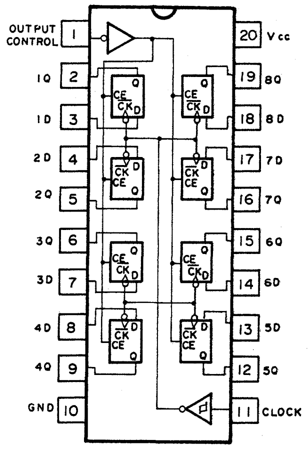
HD74LS157FP


CLEAR 1
1Q 2
1D 3
2D 4
2Q 5
3D 6
3Q 7
GND 8
16 Vcc
15 6Q
14 6D
13 5D
12 5Q
11 4D
10 4Q
9 CLOCK
CLEAR
CK
D
Q

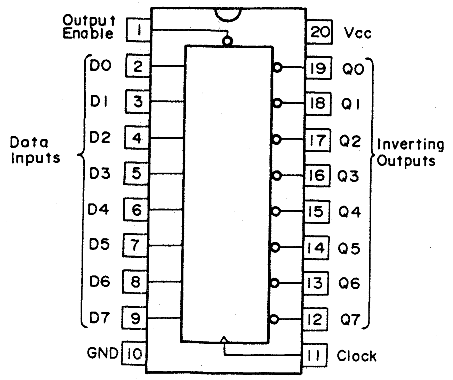
HD74HC174FP


A 1
B 2
C 3
G2A 4
G2B 5
G1 6
Y7 7
GND 8
SELECT
ENABLE
OUTPUT
16 Vcc
15 Y0
14 Y1
13 Y2
12 Y3
11 Y4
10 Y5
9 Y6
DATA OUTPUTS

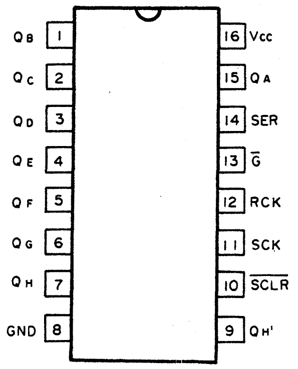
HD74LS374FP


OUTPUT CONTROL 1
1Q 2
1D 3
2D 4
2Q 5
3Q 6
3D 7
4D 8
4Q 9
GND 10
20 Vcc
19 8Q
18 8D
17 7D
16 7Q
15 6Q
14 6D
13 5D
12 5Q
11 CLOCK
CE
CK
D
Q

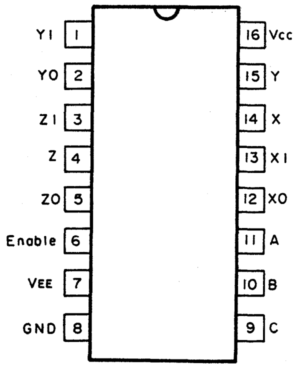
HD74HC238FP


Output Enable 1
Data Inputs
D0 2
D1 3
D2 4
D3 5
D4 6
D5 7
D6 8
D7 9
GND 10
20 Vcc
19 Q0
18 Q1
17 Q2
16 Q3
15 Q4
14 Q5
13 Q6
12 Q7
11 Clock
Inverting Outputs

HD74HC564FP

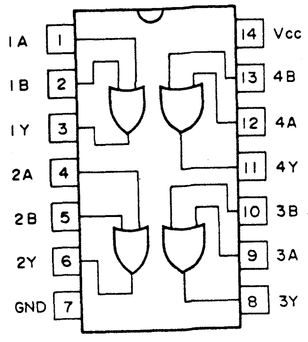

QB 1
QC 2
QD 3
QE 4
QF 5
QG 6
QH 7
GND 8
16 Vcc
15 QA
14 SER
13 G̅
12 RCK
11 SCK
10 SCLR
9 QH'

HD74HC595FP
HD74HC595AP


Y1 1
Y0 2
Z1 3
Z 4
Z0 5
Enable 6
VEE 7
GND 8
16 Vcc
15 Y
14 X
13 X1
12 X0
11 A
10 B
9 C

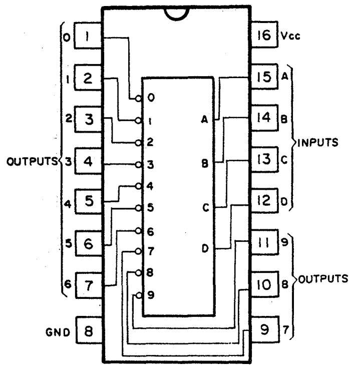
MC74HC4053N

SEMICONDUCTORS



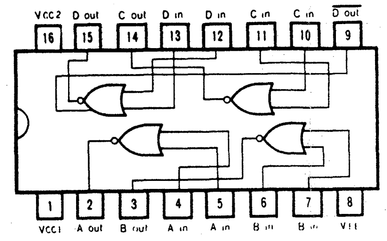
1A 1
1B 2
1Y 3
2A 4
2B 5
2Y 6
GND 7
8 3Y
9 3A
10 3B
11 4Y
12 4A
13 4B
14 Vcc

SN74ALS32N



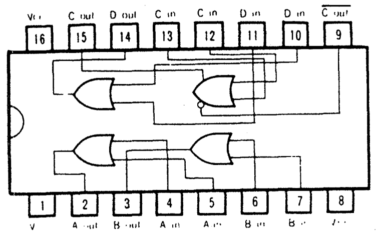
OUTPUTS
0 1
1 2
2 3
3 4
4 5
5 6
6 7
GND 8
9 7
10 8
11 9
12 D
13 C
14 B
15 A
16 Vcc
INPUTS
OUTPUTS
A
B
C
D
0
1
2
3
4
5
6
7
8
9

HD74LS42P



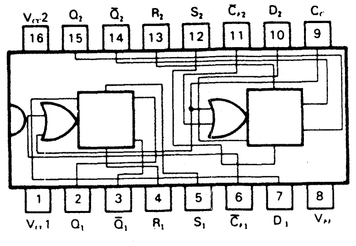
VCC2 16
D out 15
C out 14
D in 13
D in 12
C in 11
C in 10
D̄ out 9
VCC1 1
A out 2
B out 3
A in 4
A in 5
B in 6
B in 7
VEE 8

MC10H102L



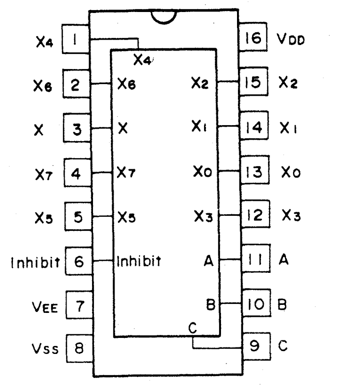
Vcc 16
C out 15
D out 14
C in 13
C in 12
D in 11
D in 10
C̄ out 9
V 1
A out 2
B out 3
A in 4
A in 5
B in 6
B in 7
8

MC10103L



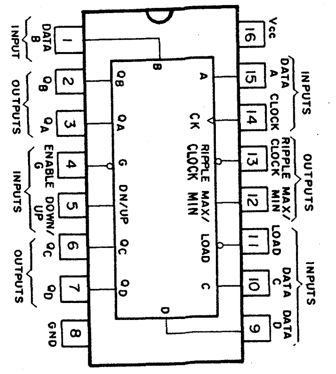
Vcc2 16
Q2 15
Q̄2 14
R2 13
S2 12
C̄E2 11
D2 10
Cc 9
Vcc1 1
Q1 2
Q̄1 3
R1 4
S1 5
C̄E1 6
D1 7
VEE 8

MC10H131L



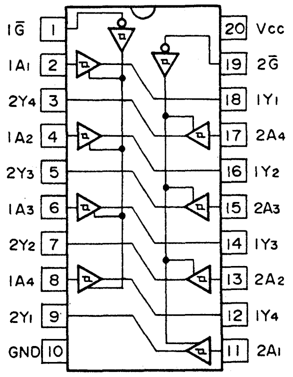
X4 1
X6 2
X 3
X7 4
X5 5
Inhibit 6
VEE 7
Vss 8
16 VDD
15 X2
14 X1
13 X0
12 X3
11 A
10 B
9 C
X4
X6
X
X7
X5
Inhibit
X2
X1
X0
X3
A
B
C

HD14051BFP



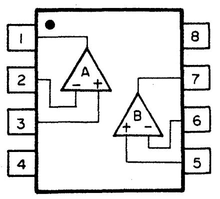
DATA B INPUT 1
OUTPUTS QB 2
QA 3
INPUTS ENABLE G 4
DOWN/UP 5
OUTPUTS QC 6
QD 7
GND 8
16 Vcc
15 DATA A INPUTS
14 CLOCK
13 RIPPLE CLOCK OUTPUTS
12 MAX/MIN
11 LOAD INPUTS
10 DATA C
9 DATA D
B
A
QB
QA
G
DN/UP
QC
QD
CK
RIPPLE CLOCK
MAX/MIN
LOAD
C
D

SN74ALS191N



1Ḡ 1
1A1 2
2Y4 3
1A2 4
2Y3 5
1A3 6
2Y2 7
1A4 8
2Y1 9
GND 10
20 Vcc
19 2Ḡ
18 1Y1
17 2A4
16 1Y2
15 2A3
14 1Y3
13 2A2
12 1Y4
11 2A1

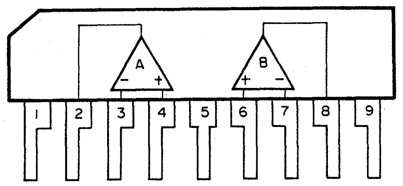
HD74LS244FP



1
2
3
4
5
6
7
8
A
B

Pin name
1. A OUTPUT
2. A (−) INPUT
3. A (+) INPUT
4. V⁻
5. B (+) INPUT
6. B (−) INPUT
7. B OUTPUT
8. V⁺

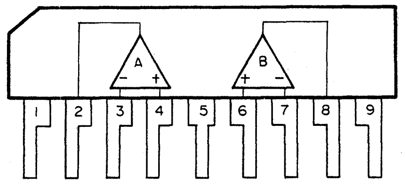
NJM072M



1
2
3
4
5
6
7
8
9
A
B

Pin name
1. V⁺
2. A OUTPUT
3. A (−) INPUT
4. A (+) INPUT
5. V⁻
6. B (+) INPUT
7. B (−) INPUT
8. B OUTPUT
9. V⁺

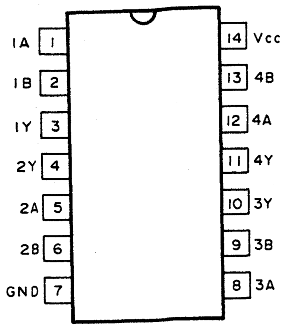
NJM072S



1
2
3
4
5
6
7
8
9
A
B

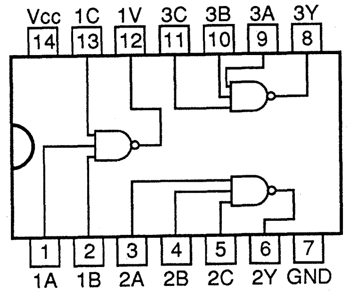
Pin name
1. V⁺
2. A OUTPUT
3. A − INPUT
4. A + INPUT
5. V⁻
6. B + INPUT
7. B − INPUT
8. B OUTPUT
9. V⁺

NJM4556S



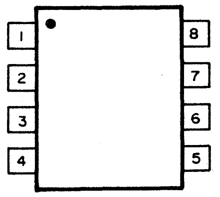
1A 1
1B 2
1Y 3
2Y 4
2A 5
2B 6
GND 7
14 Vcc
13 4B
12 4A
11 4Y
10 3Y
9 3B
8 3A

HD74HC7266FP



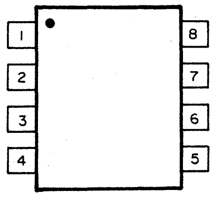
Vcc 14
1C 13
1V 12
3C 11
3B 10
3A 9
3Y 8
1 1A
2 1B
3 2A
4 2B
5 2C
6 2Y
7 GND

HD74HC10CFP



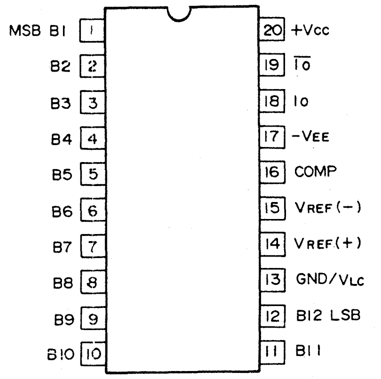
Pin name
1. GROUND
2. + INPUT
3. − INPUT
4. V⁻
5. BAL
6. BAL/STROBE
7. OUTPUT
8. V⁺

NJM311M



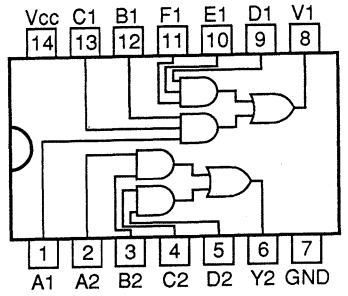
Pin name
1. GND
2. TRIGGER
3. OUTPUT
4. RESET
5. CONTROL VOLTAGE
6. SLESHHOLD
7. DISCHARGE
8. V⁺

NJM555M



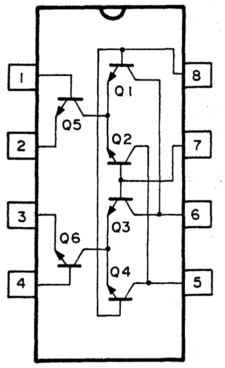
MSB B1 1
B2 2
B3 3
B4 4
B5 5
B6 6
B7 7
B8 8
B9 9
B10 10
20 +Vcc
19 Īo
18 Io
17 −VEE
16 COMP
15 VREF(−)
14 VREF(+)
13 GND/VLC
12 B12 LSB
11 B11

AM6012DC



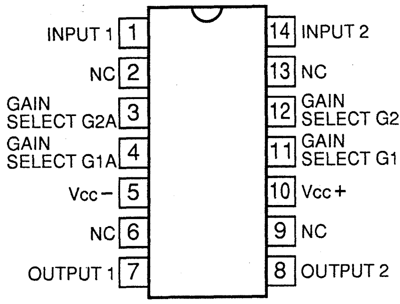
Vcc 14
C1 13
B1 12
F1 11
E1 10
D1 9
V1 8
1 A1
2 A2
3 B2
4 C2
5 D2
6 Y2
7 GND

MC74HC58F



1
2
3
4
5
6
7
8
Q1
Q2
Q3
Q4
Q5
Q6

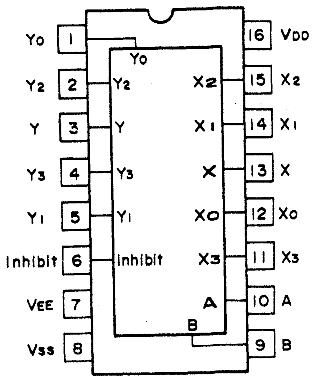
μPA101G



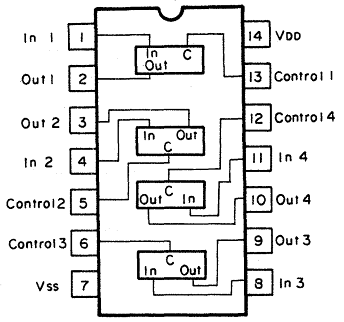
INPUT 1 1
NC 2
GAIN SELECT G2A 3
GAIN SELECT G1A 4
Vcc− 5
NC 6
OUTPUT 1 7
14 INPUT 2
13 NC
12 GAIN SELECT G2B
11 GAIN SELECT G1B
10 Vcc+
9 NC
8 OUTPUT 2

μA733CNS

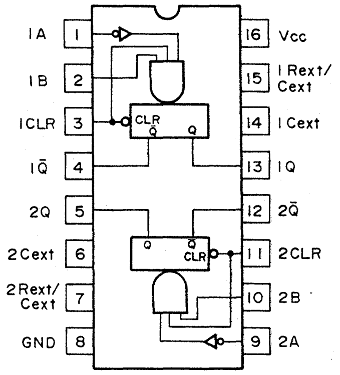
SEMICONDUCTORS


Yo 1
Y2 2
Y 3
Y3 4
Y1 5
Inhibit 6
VEE 7
Vss 8
16 VDD
15 X2
14 X1
13 X
12 Xo
11 X3
10 A
9 B

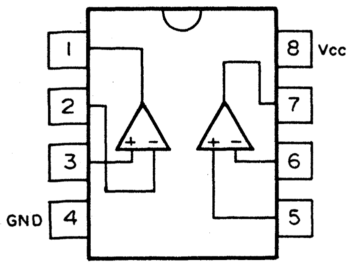
HD14052BFP
MC14052BCP


In 1 1
Out 1 2
Out 2 3
In 2 4
Control 2 5
Control 3 6
Vss 7
14 VDD
13 Control 1
12 Control 4
11 In 4
10 Out 4
9 Out 3
8 In 3

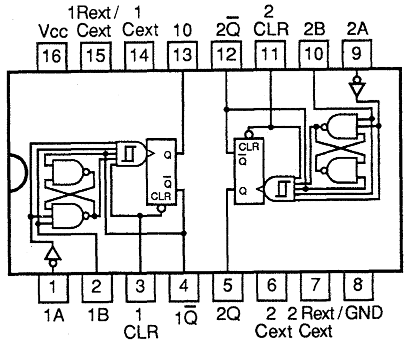
HD14066BFP


1A 1
1B 2
1CLR 3
1Q̄ 4
2Q 5
2Cext 6
2Rext/Cext 7
GND 8
16 Vcc
15 1Rext/Cext
14 1Cext
13 1Q
12 2Q̄
11 2CLR
10 2B
9 2A

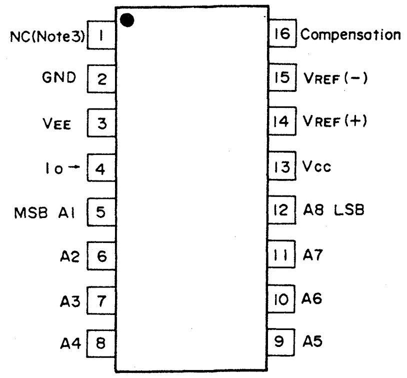
HD74HC123FP


1
2
3
GND 4
8 Vcc
7
6
5

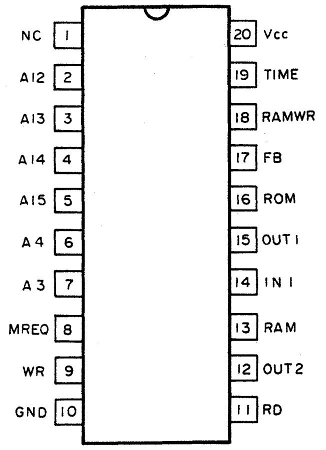
NJM4558D


Vcc 16
1Rext/Cext 15
1 Cext 14
1Q 13
2Q̄ 12
2 CLR 11
2B 10
2A 9
1A 1
1B 2
1 CLR 3
1Q̄ 4
2Q 5
2 Cext 6
2Rext/Cext 7
GND 8

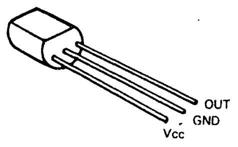
HD74HC221FP


NC(Note3) 1
GND 2
VEE 3
Io 4
MSB A1 5
A2 6
A3 7
A4 8
16 Compensation
15 VREF(−)
14 VREF(+)
13 Vcc
12 A8 LSB
11 A7
10 A6
9 A5

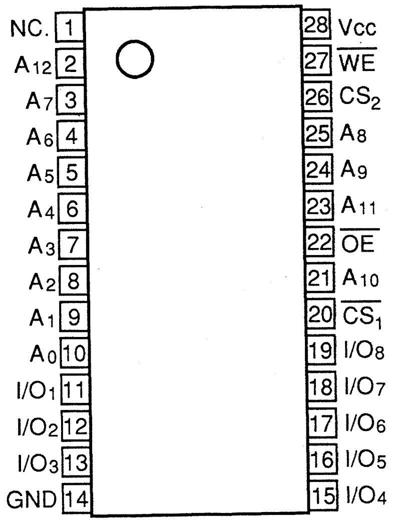
DAC0808LCN


NC 1
A12 2
A13 3
A14 4
A15 5
A4 6
A3 7
MREQ 8
WR 9
GND 10
20 Vcc
19 TIME
18 RAMWR
17 FB
16 ROM
15 OUT1
14 IN1
13 RAM
12 OUT2
11 RD

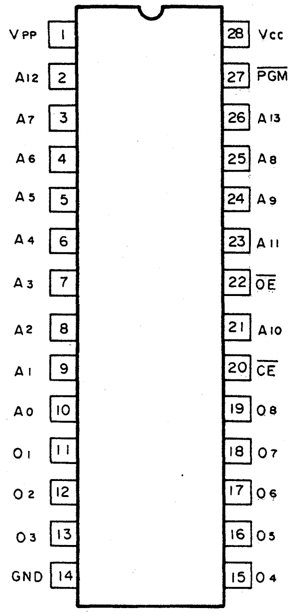
DTM-5010



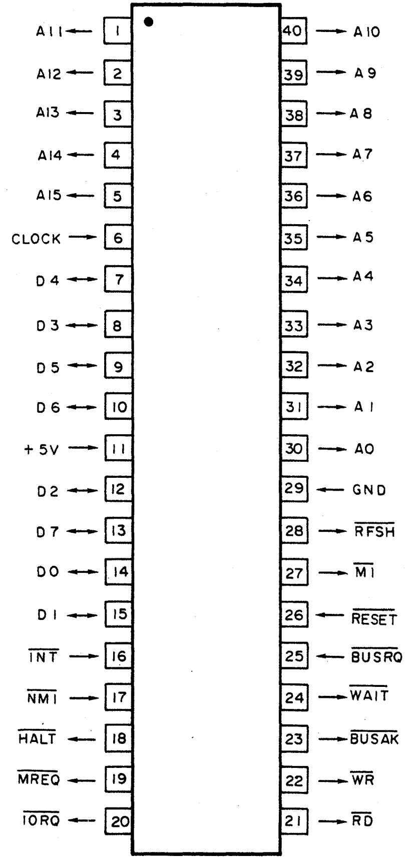
PST518B


NC. 1
A12 2
A7 3
A6 4
A5 5
A4 6
A3 7
A2 8
A1 9
A0 10
I/O1 11
I/O2 12
I/O3 13
GND 14
28 Vcc
27 W̄Ē
26 CS2
25 A8
24 A9
23 A11
22 ŌĒ
21 A10
20 C̄S̄1
19 I/O8
18 I/O7
17 I/O6
16 I/O5
15 I/O4

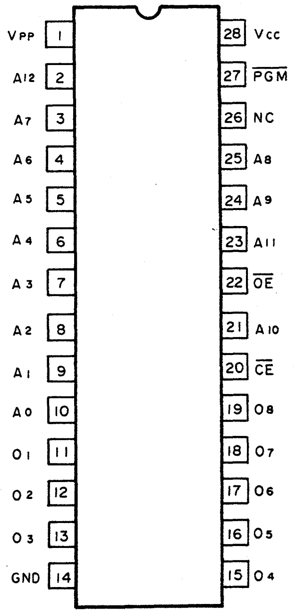
MB8464A-15LL


VPP 1
A12 2
A7 3
A6 4
A5 5
A4 6
A3 7
A2 8
A1 9
A0 10
O1 11
O2 12
O3 13
GND 14
28 Vcc
27 P̄Ḡ M̄
26 A13
25 A8
24 A9
23 A11
22 ŌĒ
21 A10
20 C̄Ē
19 O8
18 O7
17 O6
16 O5
15 O4

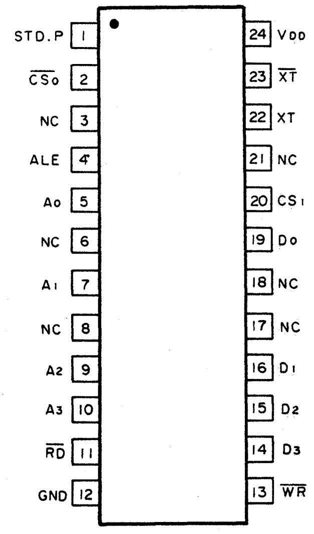
MBM27C256∗T


A11 1
A12 2
A13 3
A14 4
A15 5
CLOCK 6
D4 7
D3 8
D5 9
D6 10
+5V 11
D2 12
D7 13
D0 14
D1 15
ĪN̄T̄ 16
N̄M̄Ī 17
H̄ĀL̄T̄ 18
M̄R̄Ē Q̄ 19
ĪŌR̄Q̄ 20
40 A10
39 A9
38 A8
37 A7
36 A6
35 A5
34 A4
33 A3
32 A2
31 A1
30 A0
29 GND
28 R̄F̄S̄H̄
27 M̄Ī
26 R̄ĒS̄ĒT̄
25 B̄ŪS̄R̄Q̄
24 W̄ĀĪT̄
23 B̄ŪS̄ĀK̄
22 W̄R̄
21 R̄D̄

LH0080A


VPP 1
A12 2
A7 3
A6 4
A5 5
A4 6
A3 7
A2 8
A1 9
A0 10
O1 11
O2 12
O3 13
GND 14
28 Vcc
27 P̄Ḡ M̄
26 NC
25 A8
24 A9
23 A11
22 ŌĒ
21 A10
20 C̄Ē
19 O8
18 O7
17 O6
16 O5
15 O4

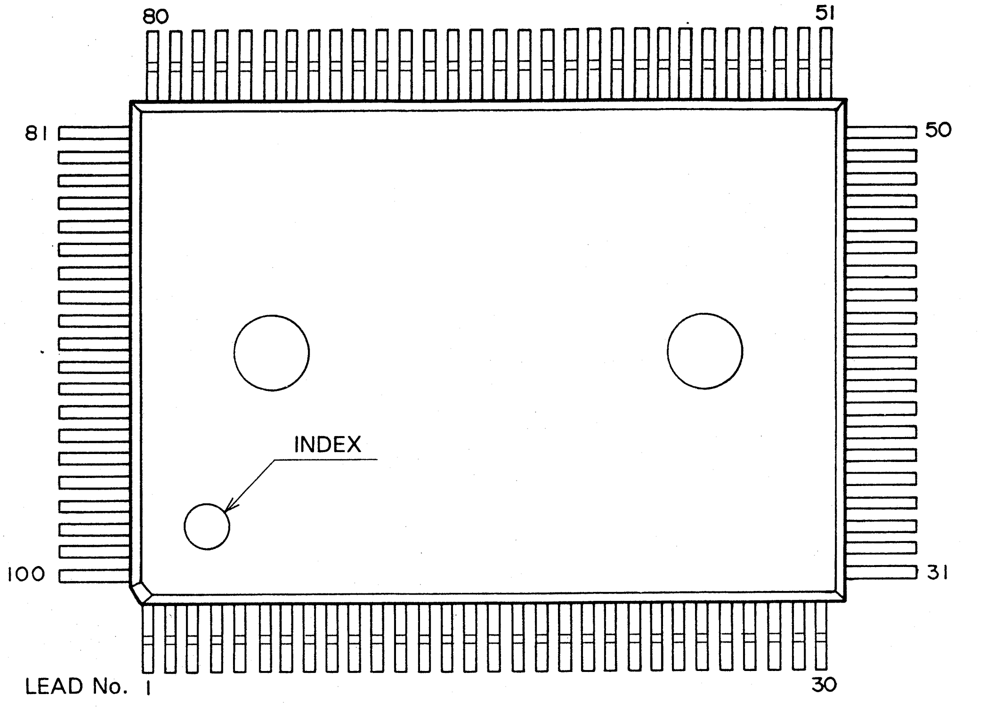
MBM27C64∗V


STD.P 1
C̄S̄o 2
NC 3
ALE 4
Ao 5
NC 6
A1 7
NC 8
A2 9
A3 10
R̄D̄ 11
GND 12
24 VDD
23 X̄T̄
22 XT
21 NC
20 CS1
19 Do
18 NC
17 NC
16 D1
15 D2
14 D3
13 W̄R̄

MSM6242BGS-VK

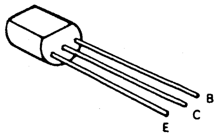
SEMICONDUCTORS

CTM5020

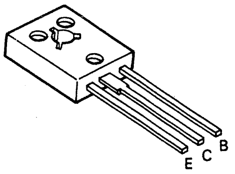


Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	CONT	26	TSD0	51	GETD	76	DD3
2	A13	27	TSD1	52	CA0	77	SING
3	VDD	28	VDD	53	VDD	78	VDD
4	A14	29	TSD2	54	CA4	79	R10M
5	A15	30	AX2	55	CA3	80	10M
6	INT0	31	AX1	56	CA2	81	HLDF
7	VX3	32	AX0	57	CA1	82	SGA
8	VX2	33	AX3	58	CD3	83	ROSP
9	VX1	34	HS2	59	CD2	84	ROD
10	VX0	35	HS1	60	CD4	85	HLDL
11	DA0	36	TDIO	61	CD1	86	ROUB
12	DA1	37	TWE	62	CD5	87	ROB
13	DA2	38	TCK1	63	DC4	88	ROQ
14	DA3	39	TST1	64	CD7	89	ROED
15	VSS	40	VSS	65	VSS	90	VSS
16	DA4	41	TST2	66	DC3	91	D7
17	DA5	42	TADD	67	DC2	92	D5
18	DA6	43	TCK2	68	CD6	93	D3
19	DA7	44	VS2	69	DC1	94	D1
20	DA8	45	VS1	70	DC0	95	ALE
21	DA9	46	VA0	71	CD0	96	D6
22	ROR	47	VA4	72	DD7	97	D4
23	ROA	48	VA3	73	DD6	98	D2
24	LEVX	49	VA2	74	DD5	99	D0
25	TCL	50	VA1	75	DD4	100	WR

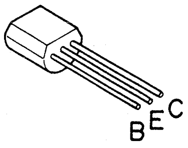
SEMICONDUCTORS



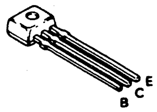
2SA684 (Q)
2SA1208 (S, T)
2SC2271 (D)
2SC2910 (S, T)
2SC1384 (R, S)
2SC1384 (Q)
2SA1005 (K)



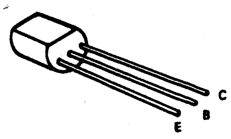
2SA1209 (S, T)
2SA1406 (E, F)
2SC2911 (S, T)
2SC3600 (E, F)



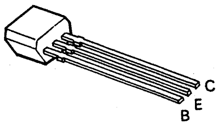
2SA1161
2SC3779 (D)



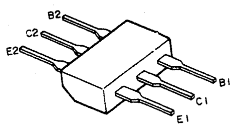
2SA1175 (F)
2SC2785 (F)
2SC3732 (L)
2SA1174 (E, F)



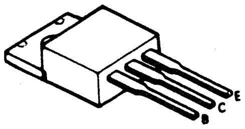
2SA1206



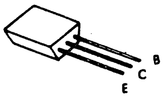
2SA1565
2SC4049


B2
C2
E2
B1
C1
E1

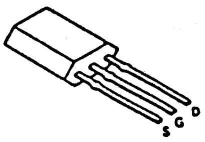
2SC4072
2SC3066 (F)



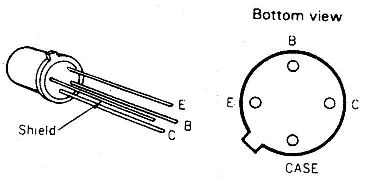
2SB1133 (S)
2SD1666 (S)



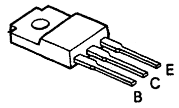
2SC3315 (C)
2SC3354 (T, S)



2SK304 (F)

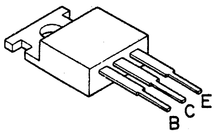

Bottom view
B
E
C
CASE
E
B
C
Shield

2SC1164 (O)∗S

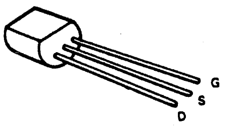


2SD1409

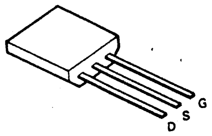
SEMICONDUCTORS



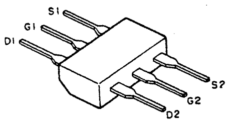
2SD613 (E)



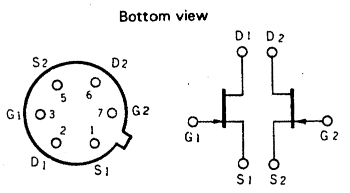
2SK583



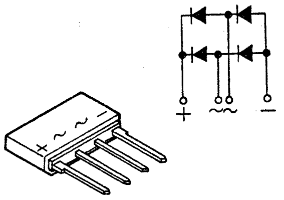
2SK241 (GR)


S1
G1
D1
S2
G2
D2

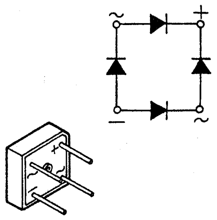
2SK332 (E)


Bottom view
S2
D2
5
6
G1
3
7
G2
2
1
D1
S1
D1
D2
G1
G2
S1
S2

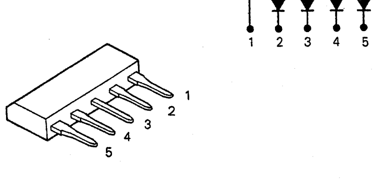
DN1901



S1VB60



S4VB40F


1
2
3
4
5
1
2
3
4
5

DAP401

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KENWOOD CORPORATION
17-5, 2-chome, Shibuya, Shibuya-ku, Tokyo 150, Japan

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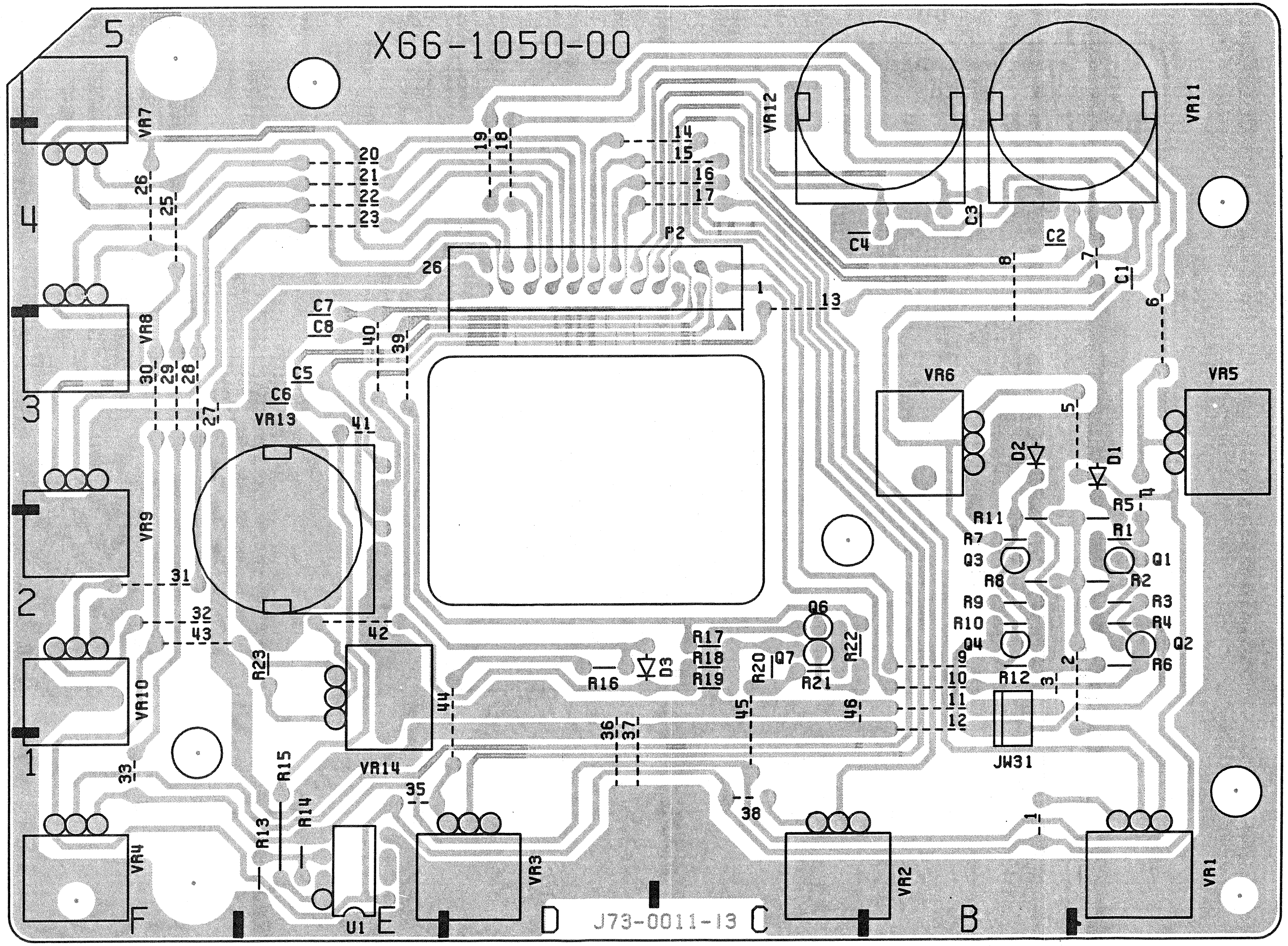
P.C BOARD

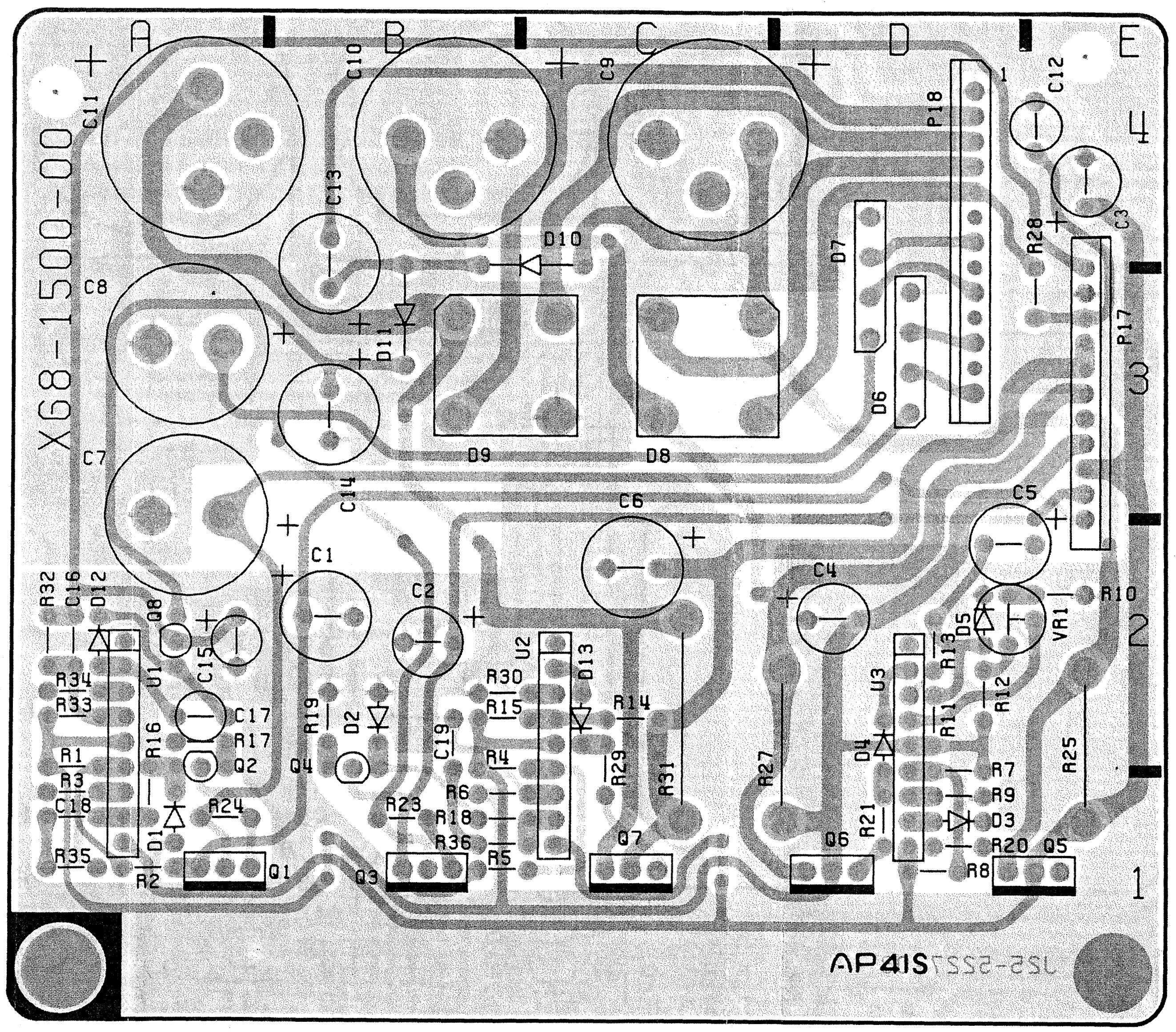
PANEL UNIT (X66-1050-01)

Pattern side view


X66-1050-00
J73-0011-13
VR1
VR2
VR3
VR4
VR5
VR6
VR7
VR8
VR9
VR10
VR11
VR12
VR13
VR14
P2
C1
C2
C3
C4
C5
C6
C7
C8
D1
D2
D3
Q1
Q2
Q3
Q4
Q6
Q7
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
U1
JW31
1
2
3
4
5
A
B
C
D
E
F

P.C BOARD

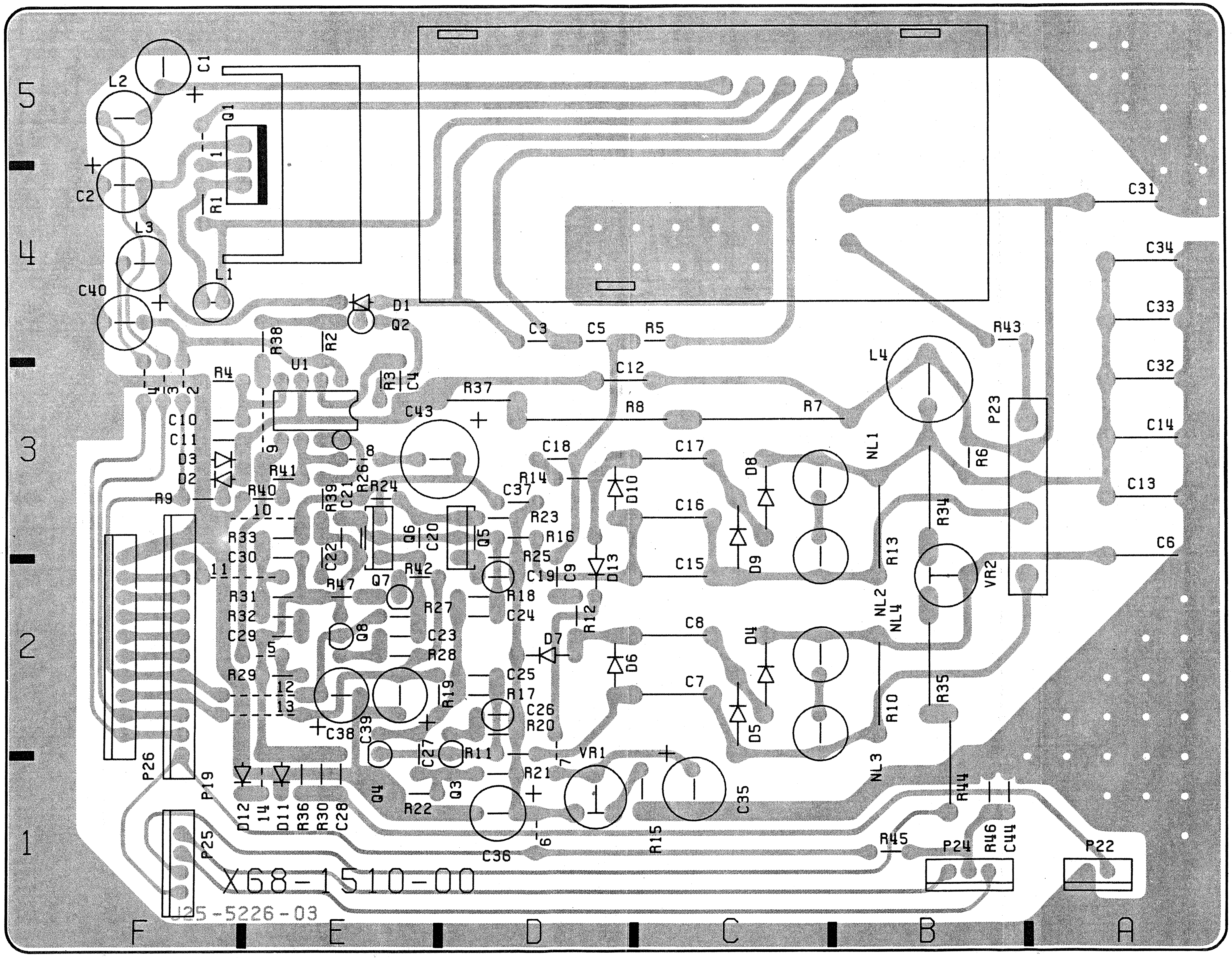
POWER SUPPLY UNIT (X68-1500-01)


A
B
C
D
E
4
3
2
1
X68-1500-00
C11
C10
C9
C12
C3
C13
P18
D10
D7
R28
P17
C8
D11
D6
D9
D8
C7
C14
C6
C5
C1
C2
C4
R10
R32
C16
D12
Q8
U1
C15
D5
VR1
R13
U2
D13
R30
R15
R14
U3
R12
R34
R33
C17
R17
Q2
R16
R19
D2
C19
R11
D4
R1
R3
Q4
R4
R29
R31
R27
R25
R7
R9
D3
C18
R24
R23
R6
R18
R36
R5
R21
R20
Q5
R35
D1
R2
Q1
Q3
Q7
Q6
R8
AP41S
J25-5227

P.C BOARD

HIGH VOLTAGE UNIT (X68-1510-02)

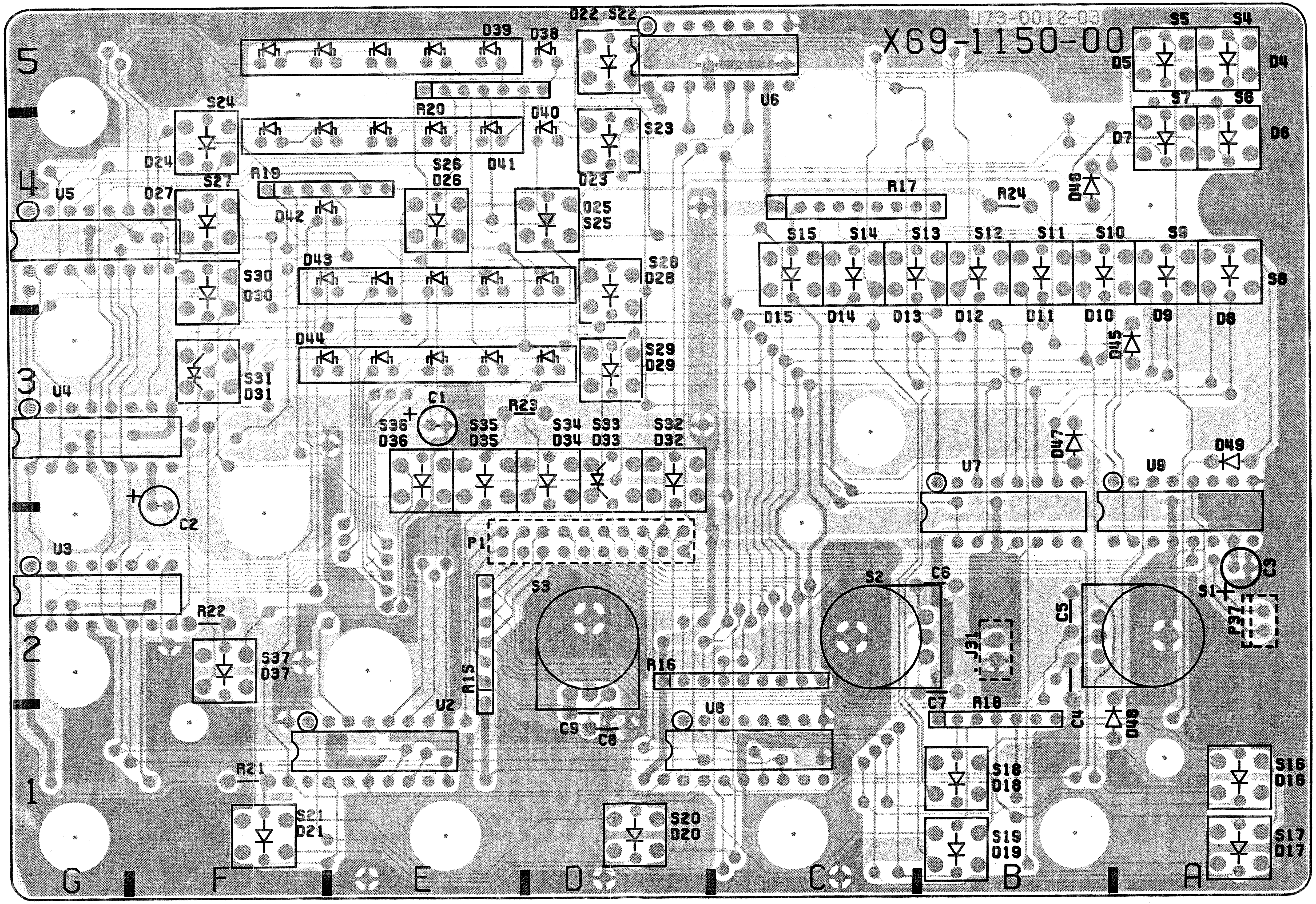
Pattern side view


5
4
3
2
1
F
E
D
C
B
A
C1
L2
Q1
C2
R1
L3
L1
C40
D1
Q2
R38
R2
U1
R4
R3
C4
R37
C3
C5
R5
C12
R8
R7
L4
R43
C31
C34
C33
C32
C14
C13
C6
P23
R6
C43
C10
C11
D3
D2
R9
R41
R40
R26
R24
R39
C21
C37
R14
C18
C17
D8
D10
NL1
R34
R23
R16
C16
R33
C30
C22
Q6
C20
Q5
R25
R42
R47
Q7
C19
C9
D13
C15
D9
R13
VR2
NL2
NL4
R31
R32
C29
Q8
R27
C23
R28
R18
C24
R12
D7
C8
D4
D6
C7
D5
R10
R35
R29
R19
C25
R17
C26
R20
C39
C38
C27
R11
Q4
Q3
R21
VR1
C35
NL3
R44
P26
P19
D12
D11
R36
R30
C28
R22
C36
R15
R45
P24
R46
C44
P22
P25
X68-1510-00
J25-5226-03

P.C BOARD

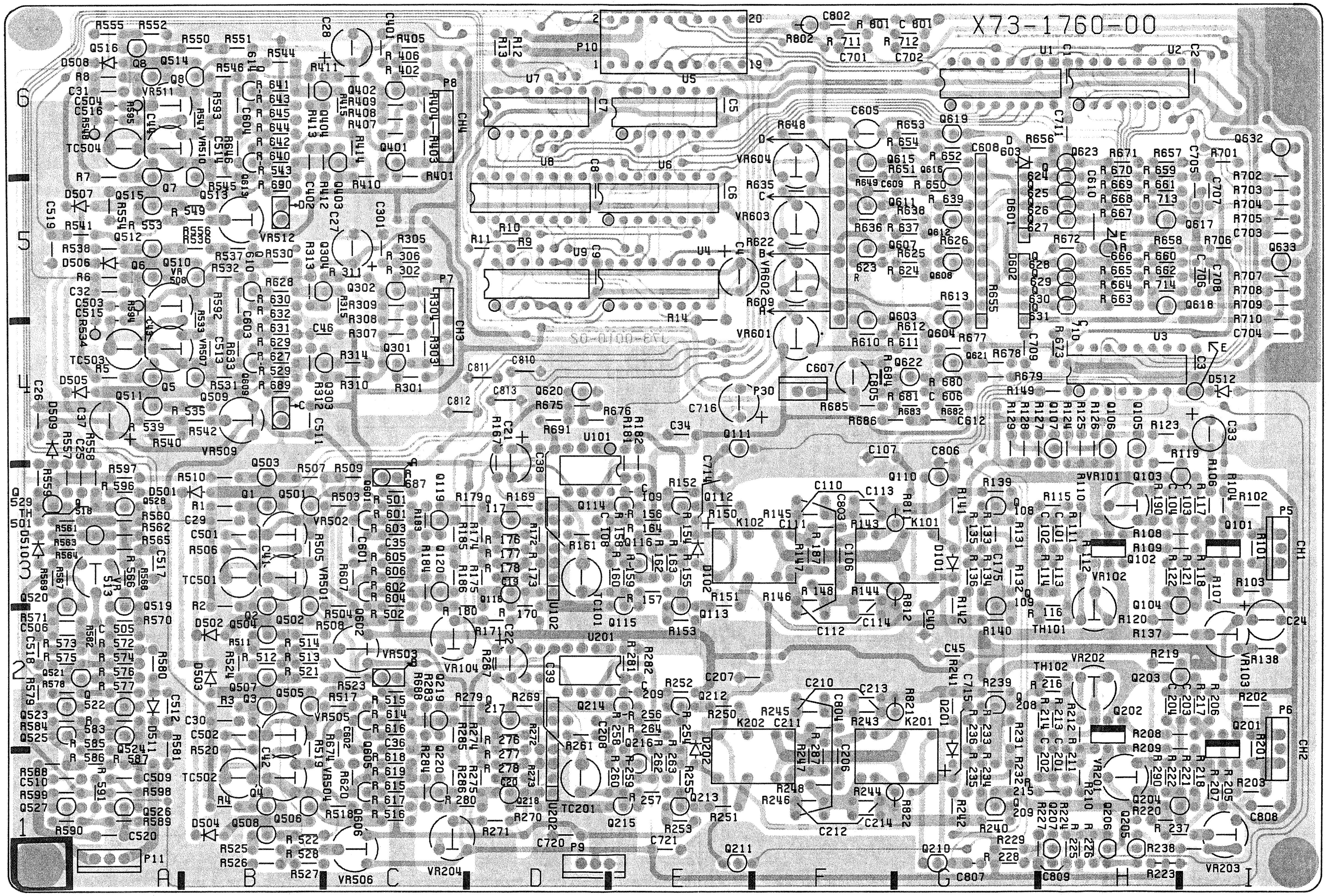
SWITCH UNIT (X69-1150-02)

Pattern side view

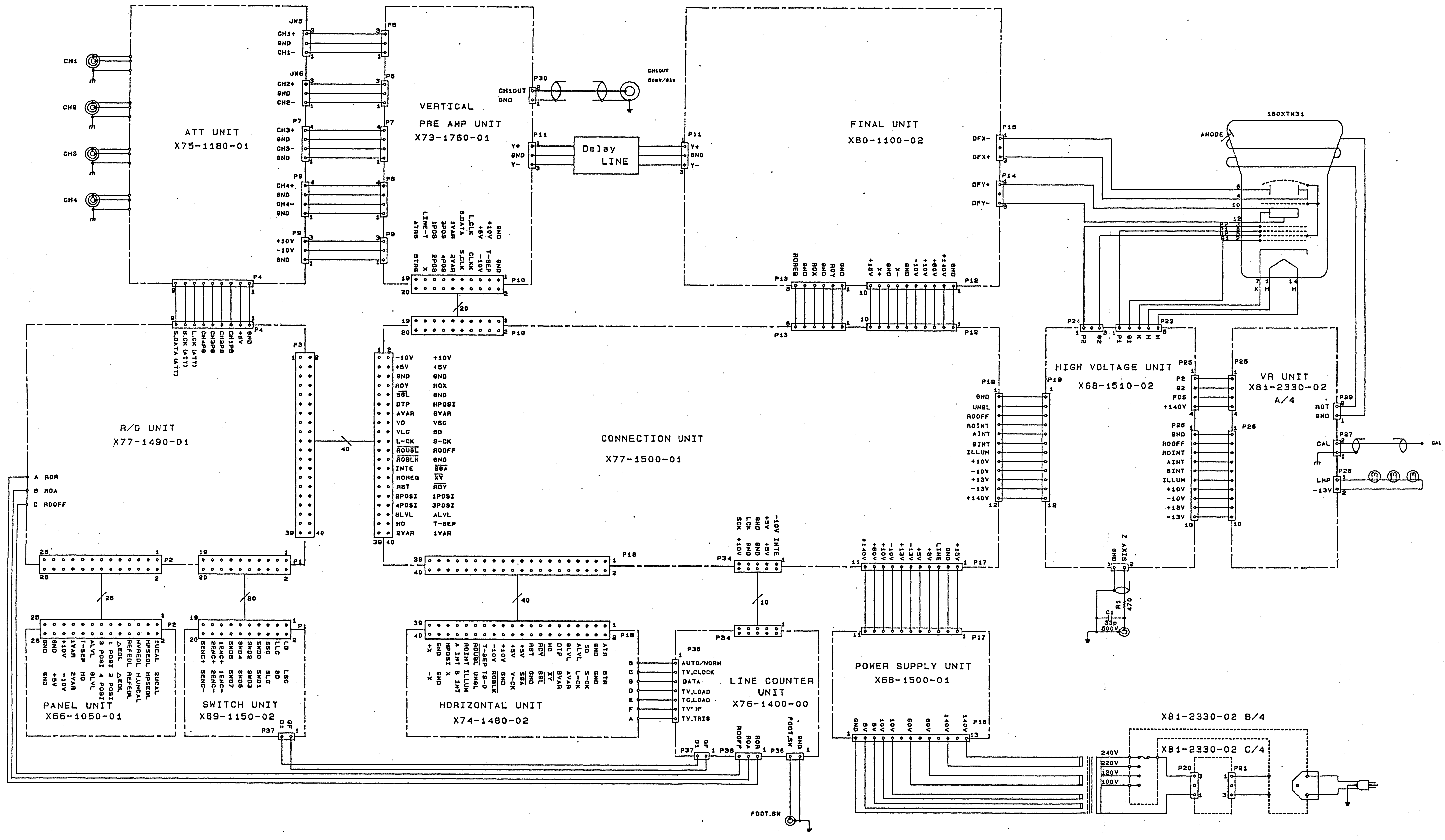

J73-0012-03
X69-1150-00
5
4
3
2
1
G
F
E
D
C
B
A
U2
U3
U4
U5
U6
U7
U8
U9
S1
S2
S3
P1
P37
J31
C1
C2
C3
C4
C5
C6
C7
C8
C9
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
S4 D4
S5 D5
S6 D6
S7 D7
S8 D8
S9 D9
S10 D10
S11 D11
S12 D12
S13 D13
S14 D14
S15 D15
S16 D16
S17 D17
S18 D18
S19 D19
S20 D20
S21 D21
S22 D22
S23 D23
S24 D24
S25 D25
S26 D26
S27 D27
S28 D28
S29 D29
S30 D30
S31 D31
S32 D32
S33 D33
S34 D34
S35 D35
S36 D36
S37 D37
D38
D39
D40
D41
D42
D43
D44
D45
D46
D47
D48
D49

P.C BOARD

VERTICAL PREAMP UNIT (X73-1760-01)

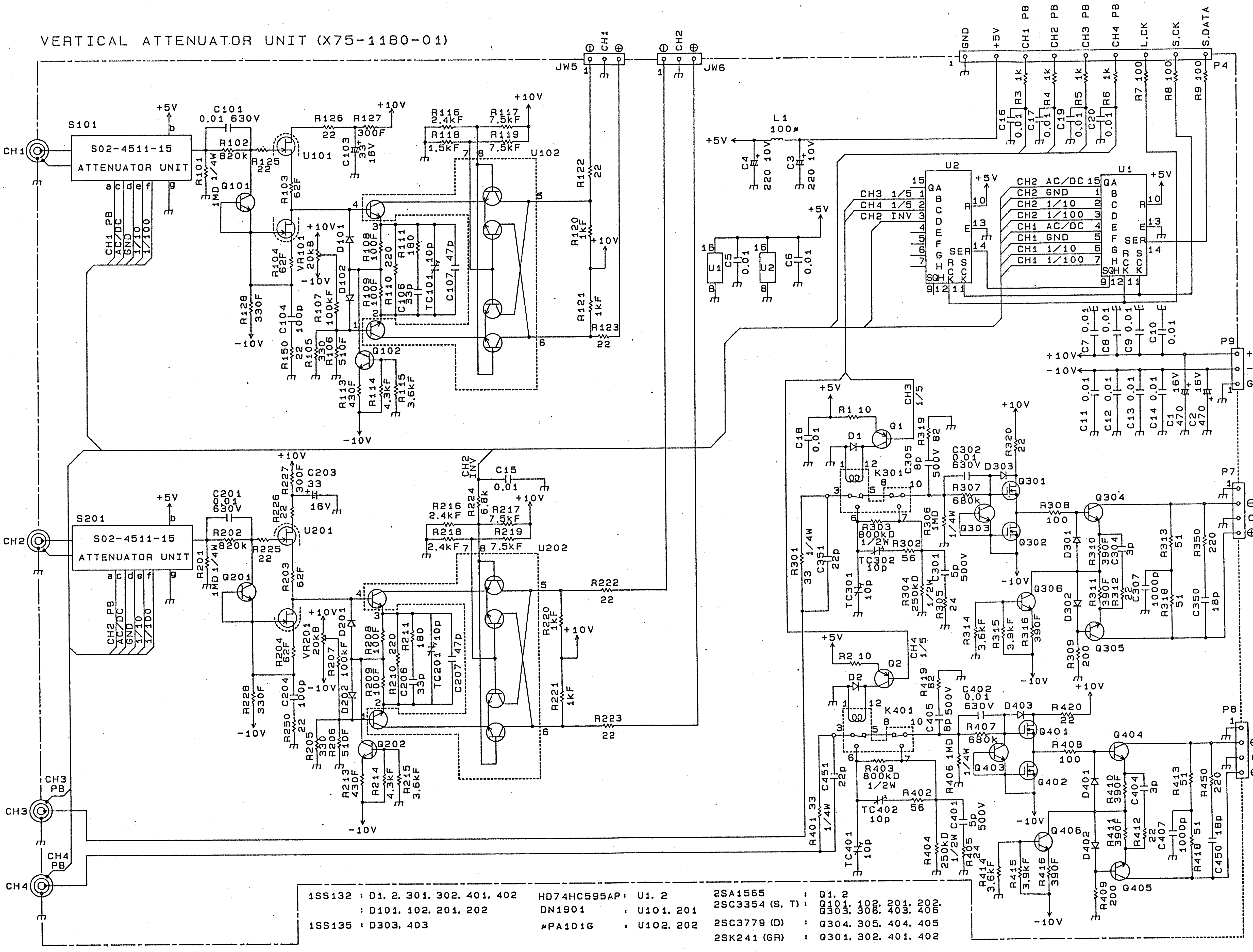

X73-1760-00
U1
U2
U3
U4
U5
U6
U7
U8
U9
U101
U102
U201
U202
K101
K102
K201
K202
P5
P6
P7
P8
P9
P10
P11
P30
CH1
CH2
CH3
CH4
VR101
VR102
VR103
VR104
VR201
VR202
VR203
VR204
VR501
VR502
VR503
VR504
VR505
VR506
VR507
VR508
VR509
VR510
VR511
VR512
VR601
VR602
VR603
VR604
TC101
TC201
TC501
TC502
TC503
TC504
TH101
TH102
A
B
C
D
E
F
G
H
I
1
2
3
4
5
6

SCHEMATIC DIAGRAM



CH1
CH2
CH3
CH4
ATT UNIT
X75-1180-01
VERTICAL
PRE AMP UNIT
X73-1760-01
CH1OUT
50mV/div
Delay
LINE
FINAL UNIT
X80-1100-02
150XTH31
ANODE
DFX-
DFX+
DFY+
DFY-
R/O UNIT
X77-1490-01
CONNECTION UNIT
X77-1500-01
HIGH VOLTAGE UNIT
X68-1510-02
VR UNIT
X81-2330-02
A/4
ROT
GND
CAL
LMP
-13V
Z AXIS
R1
470
C1
33p
500V
PANEL UNIT
X66-1050-01
SWITCH UNIT
X69-1150-02
HORIZONTAL UNIT
X74-1480-02
LINE COUNTER
UNIT
X76-1400-00
AUTO/NORM
TV.CLOCK
DATA
TV.LOAD
TC.LOAD
TV"H"
TV.TRIG
FOOT.SW
POWER SUPPLY UNIT
X68-1500-01
X81-2330-02 B/4
X81-2330-02 C/4
240V
220V
120V
100V
A RDR
B RDA
C ROOFF

VERTICAL ATTENUATOR UNIT (X75-1180-01)


CH1
CH2
CH3
CH4
CH3 PB
CH4 PB
S101
S201
S02-4511-15
ATTENUATOR UNIT
CH1 PB AC/DC GND 1/10 1/100
CH2 PB AC/DC GND 1/10 1/100
C101 0.01 630V
R102 820k
R101 1MD 1/4W
R125 22
R126 22
R127 300F
C103 33 16V
U101
Q101
R103 62F
R104 62F
VR101 20kB
D101
D102
R107 100kF
R105 330
R106 510F
R150 22
C104 100p
R128 330F
Q102
R113 430F
R114 4.3kF
R115 3.6kF
R108 100F
R109 100F
R110 220
R111 180
C106 33p
TC101 10p
C107 47p
R116 2.4kF
R117 7.5kF
R118 1.5kF
R119 7.5kF
U102
R122 22
R120 1kF
R121 1kF
R123 22
JW5
JW6
C201 0.01 630V
R202 820k
R201 1MD 1/4W
R225 22
R226 22
R227 300F
C203 33 16V
U201
Q201
R203 62F
R204 62F
VR201 20kB
D201
D202
R207 100kF
R205 330
R206 510F
R250 22
C204 100p
R228 330F
Q202
R213 430F
R214 4.3kF
R215 3.6kF
R208 100F
R209 100F
R210 220
R211 180
C206 33p
TC201 10p
C207 47p
R216 2.4kF
R217 7.5kF
R218 2.4kF
R219 7.5kF
R224 6.8k
CH2 INV
C15 0.01
U202
R222 22
R220 1kF
R221 1kF
R223 22
+5V
+10V
-10V
L1 100µ
C4 220 10V
C3 220 10V
C5 0.01
C6 0.01
U1
U2
CH3 1/5
CH4 1/5
CH2 INV
CH2 AC/DC
CH2 GND
CH2 1/10
CH2 1/100
CH1 AC/DC
CH1 GND
CH1 1/10
CH1 1/100
QA B C D E F G H SQH SER SCK RCK
P4
GND +5V CH1 PB CH2 PB CH3 PB CH4 PB L.CK S.CK S.DATA
R3 1k
R4 1k
R5 1k
R6 1k
C16 0.01
C17 0.01
C19 0.01
C20 0.01
R7 100
R8 100
R9 100
C7 0.01
C8 0.01
C9 0.01
C10 0.01
C11 0.01
C12 0.01
C13 0.01
C14 0.01
C1 470 16V
C2 470 16V
P9
+10V
-10V
GND
R1 10
Q1
D1
C18 0.01
K301
R319 82
C305 8p 500V
C302 0.01 630V
D303
R320 22
Q301
Q302
Q303
R307 680k
R306 1MD 1/4W
R303 800kD 1/2W
R302 56
TC302 10p
R301 33 1/4W
C351 22p
TC301 10p
R304 250kD 1/2W
R305 24
C301 5p 500V
R308 100
Q304
Q305
Q306
D301
D302
R310 390F
R311 390F
R312 22
C304 3p
C307 1000p
R313 51
R318 51
R350 220
C350 18p
R314 3.6kF
R315 3.9kF
R316 390F
R309 200
P7
R2 10
Q2
D2
K401
R419 82
C405 8p 500V
C402 0.01 630V
D403
R420 22
Q401
Q402
Q403
R407 680k
R406 1MD 1/4W
R403 800kD 1/2W
R402 56
TC402 10p
R401 33 1/4W
C451 22p
TC401 10p
R404 250kD 1/2W
R405 24
C401 5p 500V
R408 100
Q404
Q405
Q406
D401
D402
R410 390F
R411 390F
R412 22
C404 3p
C407 1000p
R413 51
R418 51
R450 220
C450 18p
R414 3.6kF
R415 3.9kF
R416 390F
R409 200
P8

1SS132 : D1, 2, 301, 302, 401, 402
: D101, 102, 201, 202
1SS135 : D303, 403

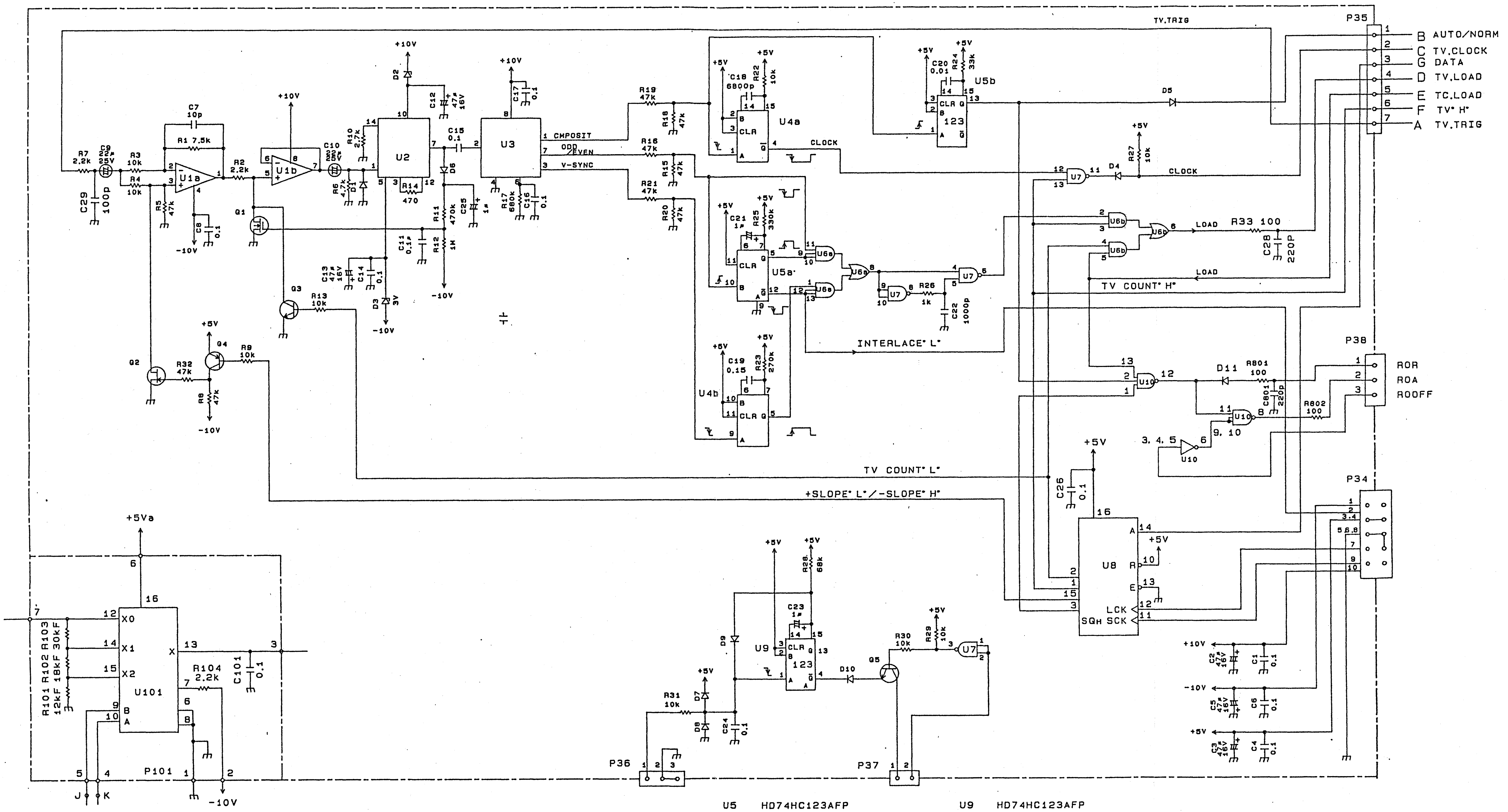
HD74HC595AP : U1, 2
DN1901 : U101, 201
µPA101G : U102, 202

2SA1565 : Q1, 2
2SC3354 (S, T) : Q101, 102, 201, 202, Q303, 306, 403, 406
2SC3779 (D) : Q304, 305, 404, 405
2SK241 (GR) : Q301, 302, 401, 402

FUNC/PinNo	U1	U2
QA (15)	CH2 AC/DC	-
B (1)	CH2 GND	CH3 1/5
C (2)	CH2 1/10	CH4 1/5
D (3)	CH2 1/100	CH2 INV

FUNC/PinNo	U1	U2
E (4)	CH1 AC/DC	-
F (5)	CH1 GND	-
G (6)	CH1 1/10	-
H (7)	CH1 1/100	-

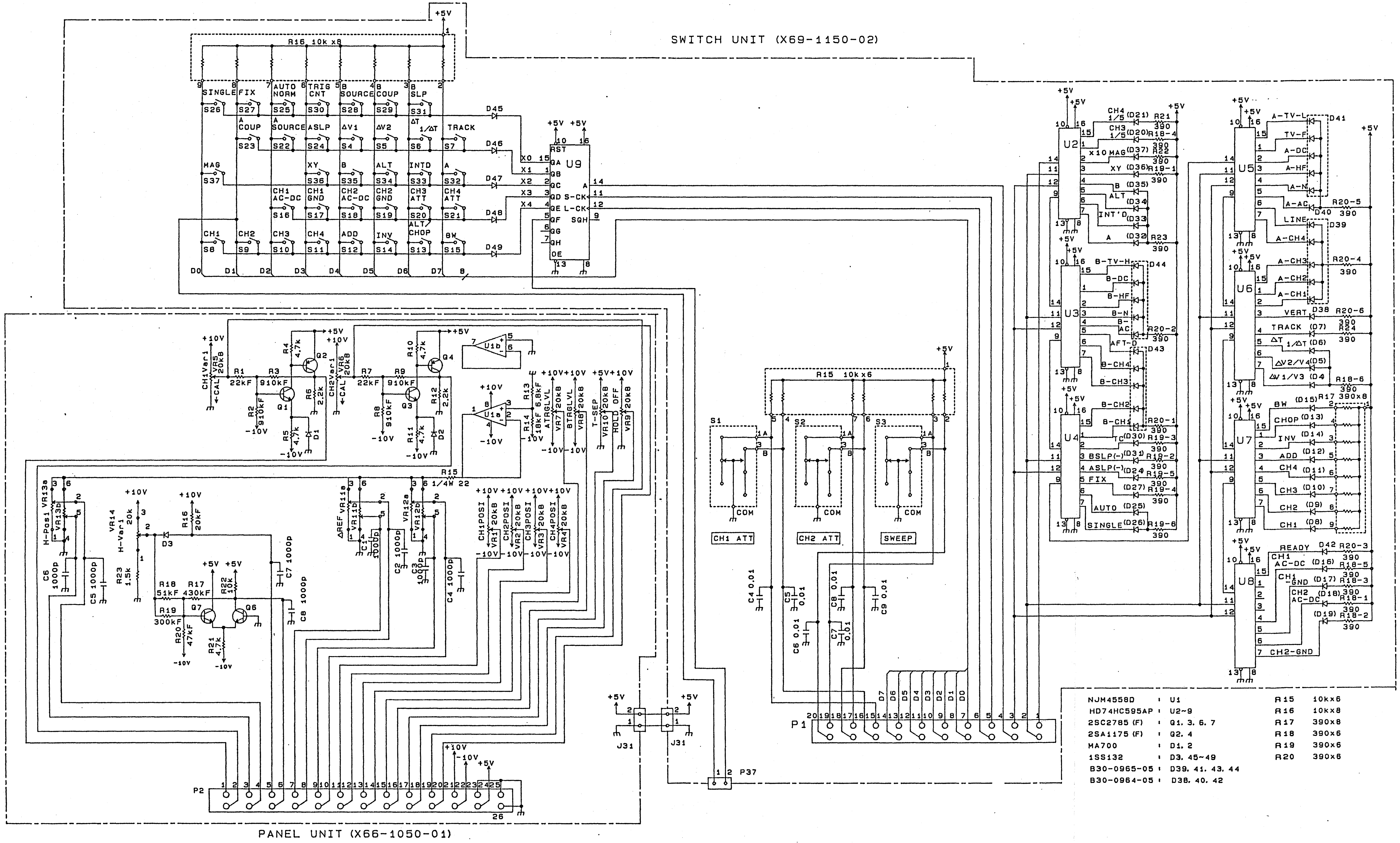
LINE COUNTER UNIT (X76-1400-00)


P35
B AUTO/NORM
C TV.CLOCK
G DATA
D TV.LOAD
E TC.LOAD
F TV* H*
A TV.TRIG
TV.TRIG
U1a
U1b
U2
U3
CMPOSIT
ODD
EVEN
V-SYNC
U4a
U4b
U5a
U5b
123
CLOCK
LOAD
R33 100
C28 220P
TV COUNT* H*
INTERLACE* L*
TV COUNT* L*
+SLOPE* L*/-SLOPE* H*
P38
ROR
ROA
ROOFF
D11
R801 100
R802 100
C801 220p
U10
P34
U8
LCK
SQH SCK
U9
Q5
D10
P36
P37
U101
X0
X1
X2
R101 12kF
R102 18kF
R103 30kF
R104 2.2k
C101 0.1
P101
+5Va
-10V
+10V
+5V
Q1
Q2
Q3
Q4
J
K

2SC2785 (F): Q3 Q4
2SA1175 (F): Q5
2SK241 (GR): Q1
2SK304 (F): Q2

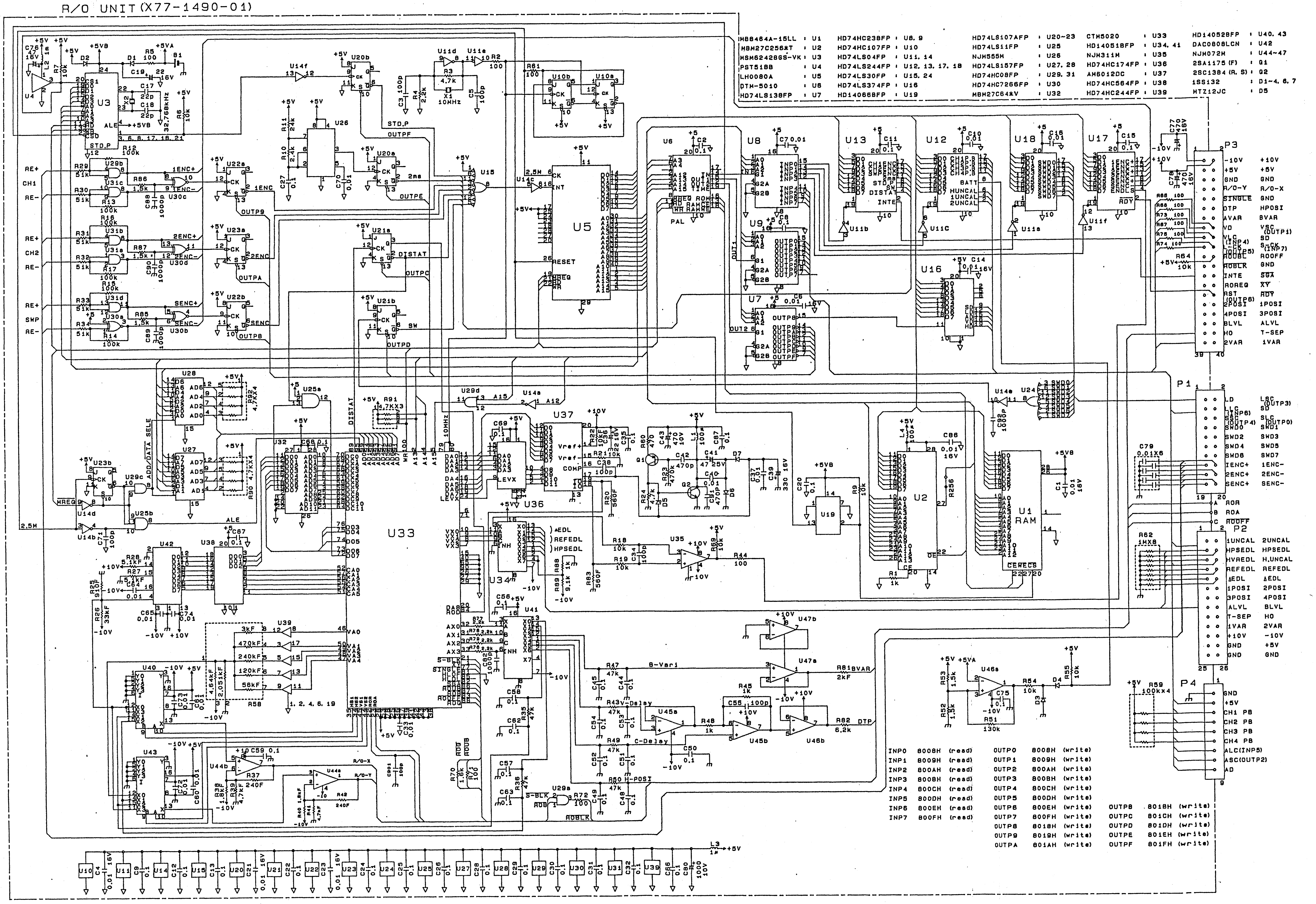
1SS132 : D4 5 6 7 8 9
MA700 : D1 10
MTZ3.0JA : D2 D3

U1	NJM072M
U2	UA733CNS
U3	LM1881M
U4	HD74HC221FP
U5	HD74HC123AFP
U6	HD74HC58F
U7	HD74HC00FP
U8	HD74HC595FP
U9	HD74HC123AFP
U10	HD74HC10FP
U101	HD14052BFP


SWITCH UNIT (X69-1150-02)
PANEL UNIT (X66-1050-01)
R16 10k x8
R15 10k x6
U1a
U1b
U2
U3
U4
U5
U6
U7
U8
U9
S-CK
L-CK
SQH
SINGLE S26
FIX S27
AUTO NORM S25
TRIG CNT S30
SOURCE S28
COUP S29
SLP S31
A COUP S23
A SOURCE S22
ASLP S24
ΔV1 S4
ΔV2 S5
ΔT 1/ΔT S6
TRACK S7
MAG S37
XY S36
B S35
ALT S34
INTD S33
A S32
CH1 AC-DC S16
CH1 GND S17
CH2 AC-DC S18
CH2 GND S19
CH3 ATT S20
CH4 ATT S21
CH1 S8
CH2 S9
CH3 S10
CH4 S11
ADD S12
INV S14
ALT/CHOP S13
BW S15
D45
D46
D47
D48
D49
CH1 ATT
CH2 ATT
SWEEP
S1
S2
S3
COM
CH1Var1 VR5 20kB
CH2Var1 VR6 20kB
CAL
Q1
Q2
Q3
Q4
Q6
Q7
ATRGLVL VR7 20kB
BTRGLVL VR8 20kB
T-SEP VR10 20kB
HOLD OFF VR9 20kB
H-Posi VR13a
H-Var1 VR14 20k
ΔREF VR11a
CH1POSI VR1 20kB
CH2POSI VR2 20kB
CH3POSI VR3 20kB
CH4POSI VR4 20kB
J31
P37
P1
P2
+5V
+10V
-10V

NJM4558D	: U1	R15	10k×6
HD74HC595AP	: U2~9	R16	10k×8
2SC2785 (F)	: Q1, 3, 6, 7	R17	390×8
2SA1175 (F)	: Q2, 4	R18	390×6
MA700	: D1, 2	R19	390×6
1SS132	: D3, 45~49	R20	390×6
B30-0965-05	: D39, 41, 43, 44		
B30-0964-05	: D38, 40, 42		

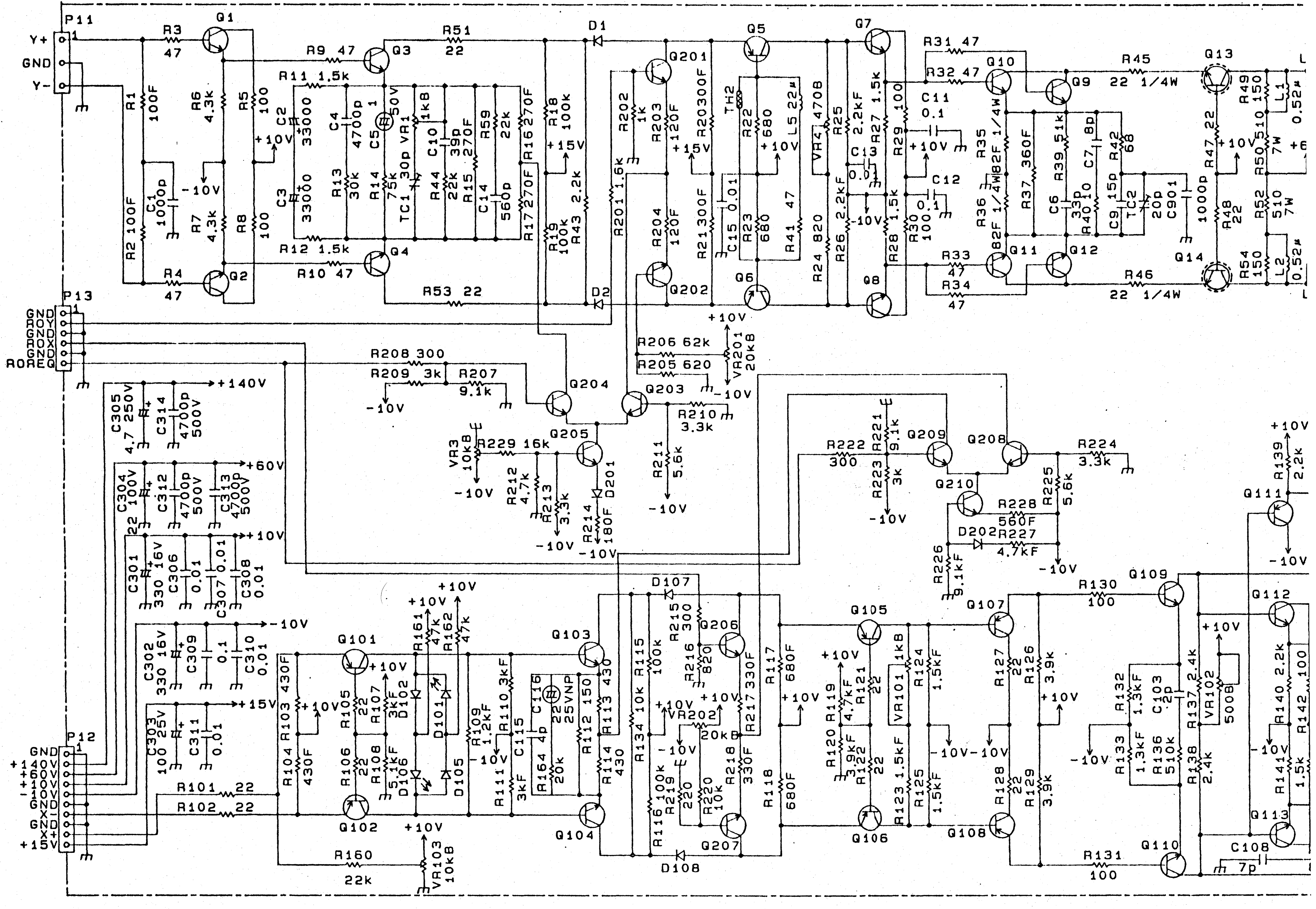
R/O UNIT (X77-1490-01)


U1 RAM
U2
U3
U4
U5
U6
U7
U8
U9
U10a
U10b
U12
U13
U16
U17
U18
U19
U26
U27
U28
U32
U33
U34
U35
U36
U37
U38
U39
U40
U41
U42
U43
U44a
U44b
U45a
U45b
U46a
U46b
U47a
U47b
P1
P2
P3
P4
X1 10MHz
32.768kHz
PAL
B1
RE+
CH1
RE-
CH2
SWP
1ENC+
1ENC-
2ENC+
2ENC-
SENC+
SENC-
STD.P
OUTPF
OUTPE
OUTPC
OUTPD
OUTPA
OUTPB
OUTP9
DISTAT
SW
2ms
ALE
RESET
MREQ
2.5M
ADD/DATA SELE
LEVX
S-Vari
V-Delay
C-Delay
H-POSI
S-BLK
ROBLK
BVAR
DTP
R/O-X
R/O-Y
-10V
+5V
GND
R/O-Y
SINGLE
DTP
AVAR
VD
VLC
LLC
AOBL
ROBLK
INTE
AOREQ
RST
2POSI
4POSI
BLVL
HO
2VAR
+10V
+5V
GND
R/O-X
GND
HPOSI
BVAR
VSC (OUTP1)
SD
S-CK (INP7)
ROOFF
GND
SGA
XY
RDY
1POSI
3POSI
ALVL
T-SEP
1VAR
LD
LSC (OUTP3)
VLC (INP6)
SD
SSC (OUTP4)
SLC (OUTP0)
SWD0
SWD1
SWD2
SWD3
SWD4
SWD5
SWD6
SWD7
1ENC+
1ENC-
2ENC+
2ENC-
SENC+
SENC-
ROR
ROA
ROOFF
1UNCAL
2UNCAL
HPSEDL
HPSEDL
HVREDL
H.UNCAL
REFEDL
REFEDL
ΔEDL
ΔEDL
1POSI
2POSI
3POSI
4POSI
ALVL
BLVL
T-SEP
HO
1VAR
2VAR
+10V
-10V
GND
+5V
GND
GND
GND
+5V
CH1 PB
CH2 PB
CH3 PB
CH4 PB
ALC(INP5)
ASC(OUTP2)
AD
L3 1μ +5V

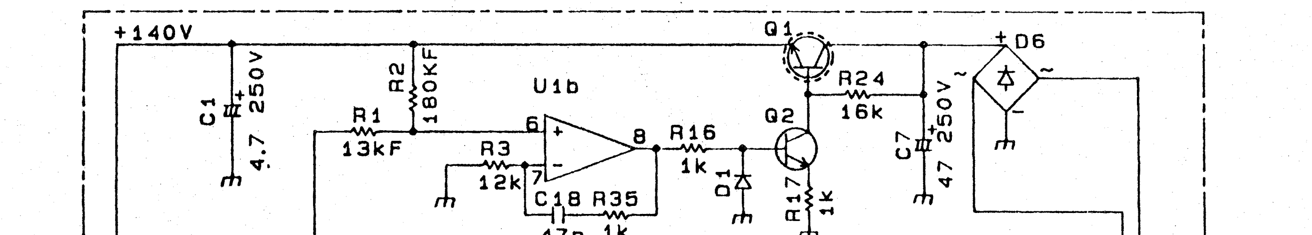
MB8464A-15LL	: U1	HD74HC238FP	: U8. 9	HD74LS107AFP	: U20~23	CTM5020	: U33	HD14052BFP	: U40. 43
MBM27C256*T	: U2	HD74HC107FP	: U10	HD74LS11FP	: U25	HD14051BFP	: U34. 41	DAC0808LCN	: U42
MSM62428GS-VK	: U3	HD74LS04FP	: U11. 14	NJM555M	: U26	NJM311M	: U35	NJM072M	: U44~47
PST518B	: U4	HD74LS244FP	: U12. 13. 17. 18	HD74LS157FP	: U27. 28	HD74HC174FP	: U36	2SA1175 (F)	: Q1
LH0080A	: U5	HD74LS30FP	: U15. 24	HD74HC08FP	: U29. 31	AM6012DC	: U37	2SC1384 (R. S)	: Q2
DTM-5010	: U6	HD74LS374FP	: U16	HD74HC7266FP	: U30	HD74HC564FP	: U38	1SS132	: D1~4. 6. 7
HD74LS138FP	: U7	HD14066BFP	: U19	MBM27C64*V	: U32	HD74HC244FP	: U39	MTZ12JC	: D5

INP0	8008H	(read)	OUTP0	8008H	(write)			
INP1	8009H	(read)	OUTP1	8009H	(write)			
INP2	800AH	(read)	OUTP2	800AH	(write)			
INP3	800BH	(read)	OUTP3	800BH	(write)			
INP4	800CH	(read)	OUTP4	800CH	(write)			
INP5	800DH	(read)	OUTP5	800DH	(write)			
INP6	800EH	(read)	OUTP6	800EH	(write)	OUTPB	801BH	(write)
INP7	800FH	(read)	OUTP7	800FH	(write)	OUTPC	801CH	(write)
			OUTP8	8018H	(write)	OUTPD	801DH	(write)
			OUTP9	8019H	(write)	OUTPE	801EH	(write)
			OUTPA	801AH	(write)	OUTPF	801FH	(write)

FINAL AMP UNIT (X80-1100-02)

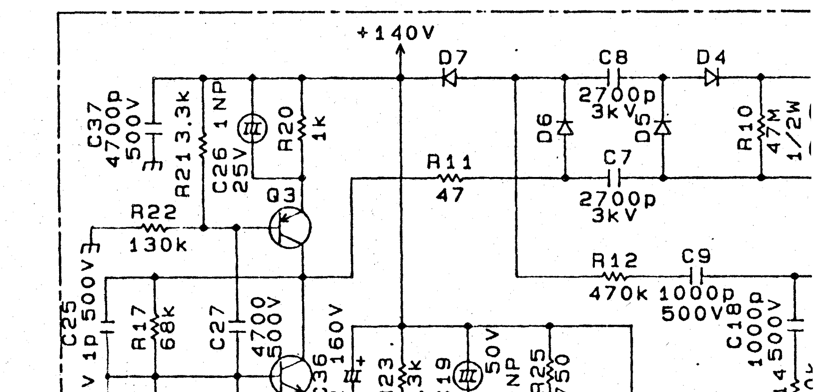

P11
Y+
GND
Y-
P13
GND
ROY
GND
ROX
GND
ROREQ
P12
GND
+140V
+60V
-10V
+10V
GND
X-
GND
X+
+15V
+140V
+60V
+10V
-10V
+15V
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
D1
D2
VR1
VR3
VR101
VR102
VR103
VR201
VR202

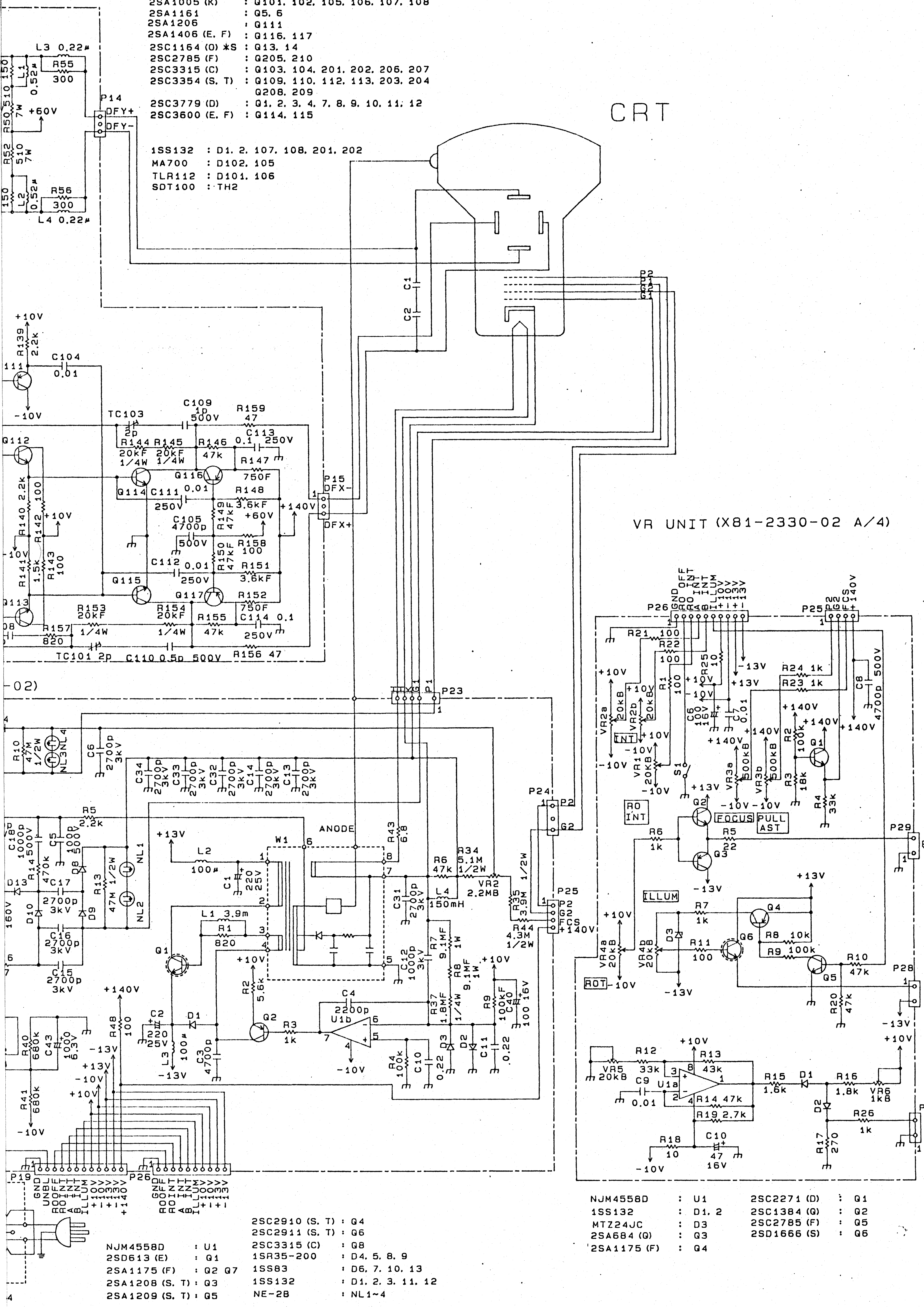
POWER SUPPLY UNIT (X68-1500-01)


P17
+140V
+60V
-10V
+10V
+13V
-13V
+5V
LINE
GND
+15V
U1a
U1b
U2a
U2b
U3a
U3b
P18
140
140
60
60
10
10
5
5
240
220
120
100

1SS132	: D1. 2	S1VB60	: D6. 7	2SD1409	: Q1. 3
MTZ13JB	: D3. 4	S4VB40F	: D8. 9	2SD1666 (S)	: Q6
MTZ5.1JB	: D5	NJM4556S	: U1. 2. 3		
MTZ7.5JA	: D13	2SA684 (Q)	: Q8		
MTZ20JC	: D12	2SB1133 (S)	: Q5. 7		
1SR35-200A	: D10. 11	2SC2271 (D)	: Q2. 4		

HIGH VOLTAGE UNIT(X68-1510-02)


+140V
GND
Z
AXIS
P22
P19
S101
L101
P20
P21
X81-2330-02 C/4
X81-2330-02 B/4


CRT
VR UNIT (X81-2330-02 A/4)
-02)
P14
DFY+
DFY-
P15
DFX-
DFX+
P23
P24
P25
P26
P27
CAL
P28
LMP
P29
ROT
P19
W1
ANODE
FOCUS
PULL AST
RO INT
INT
ILLUM
ROT
L3 0.22µ
L4 0.22µ
R55 300
R56 300
C104 0.01
C109 1p 500V
R159 47
TC103 2p
TC101 2p
C110 0.5p 500V
R156 47
L2 100µ
L1 3.9m
L4 150mH
VR2 2.2MB
R34 5.1M 1/2W
R35 3.9M 1/2W
R44 4.3M 1/2W
U1a
U1b
+140V
+60V
+13V
-13V
+10V
-10V
GND
UNBL
ROOFF
ROINT
A INT
B INT
ILLUM
+100V
-100V
+13V
-13V
+140V
G2
FCS

2SA1005 (K)	: Q101. 102. 105. 106. 107. 108
2SA1161	: Q5. 6
2SA1206	: Q111
2SA1406 (E. F)	: Q116. 117
2SC1164 (O) *S	: Q13. 14
2SC2785 (F)	: Q205. 210
2SC3315 (C)	: Q103. 104. 201. 202. 206. 207
2SC3354 (S. T)	: Q109. 110. 112. 113. 203. 204 Q208. 209
2SC3779 (D)	: Q1. 2. 3. 4. 7. 8. 9. 10. 11. 12
2SC3600 (E. F)	: Q114. 115

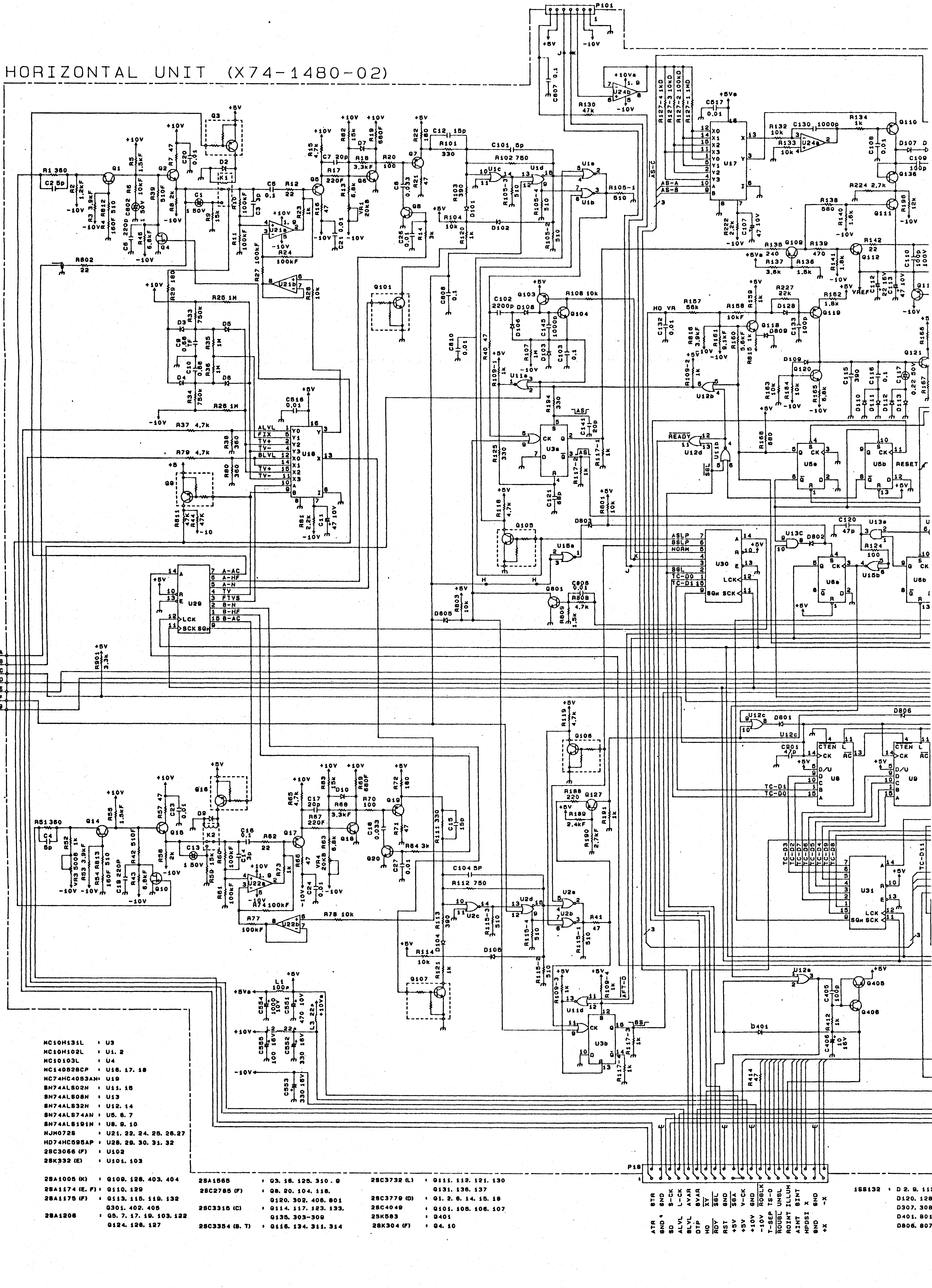
1SS132	: D1. 2. 107. 108. 201. 202
MA700	: D102. 105
TLR112	: D101. 106
SDT100	: TH2

NJM4558D	: U1
2SD613 (E)	: Q1
2SA1175 (F)	: Q2 Q7
2SA1208 (S. T)	: Q3
2SA1209 (S. T)	: Q5

2SC2910 (S. T)	: Q4
2SC2911 (S. T)	: Q6
2SC3315 (C)	: Q8
1SR35-200	: D4. 5. 8. 9
1SS83	: D6. 7. 10. 13
1SS132	: D1. 2. 3. 11. 12
NE-2B	: NL1~4

NJM4558D	: U1		2SC2271 (D)	: Q1
1SS132	: D1. 2		2SC1384 (Q)	: Q2
MTZ24JC	: D3		2SC2785 (F)	: Q5
2SA684 (Q)	: Q3		2SD1666 (S)	: Q6
2SA1175 (F)	: Q4			

HORIZONTAL UNIT (X74-1480-02)


P101
P18
STR
GND
S-CK
L-CK
AVAR
BVAR
XY
SGL
GND
SGA
V-CK
GND
ROBLK
TS-0
UNBL
ILLUM
BINT
X
GND
-X
ATR
GND
SD
ALVL
BLVL
DTP
HO
RDY
RST
+5V
+5V
+10V
-10V
T-SEP
ROUBL
ROINT
AINT
HPOSI
GND
+X
U3a
U3b
U5a
U5b
U6a
U8
U9
U16
U17
U19
U29
U30
U31
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q101
Q103
Q104
Q105
Q106
Q107
Q109
Q110
Q111
Q112
Q118
Q119
Q120
Q121
Q127
Q136
Q405
Q406
Q801
HO VR
VREF
READY
RESET
ASLP
BSLP
NORM
SGL
TC-D0
TC-D1
+5V
+10V
-10V
+5Va
+10Va
A
B
C
D
E
F
G

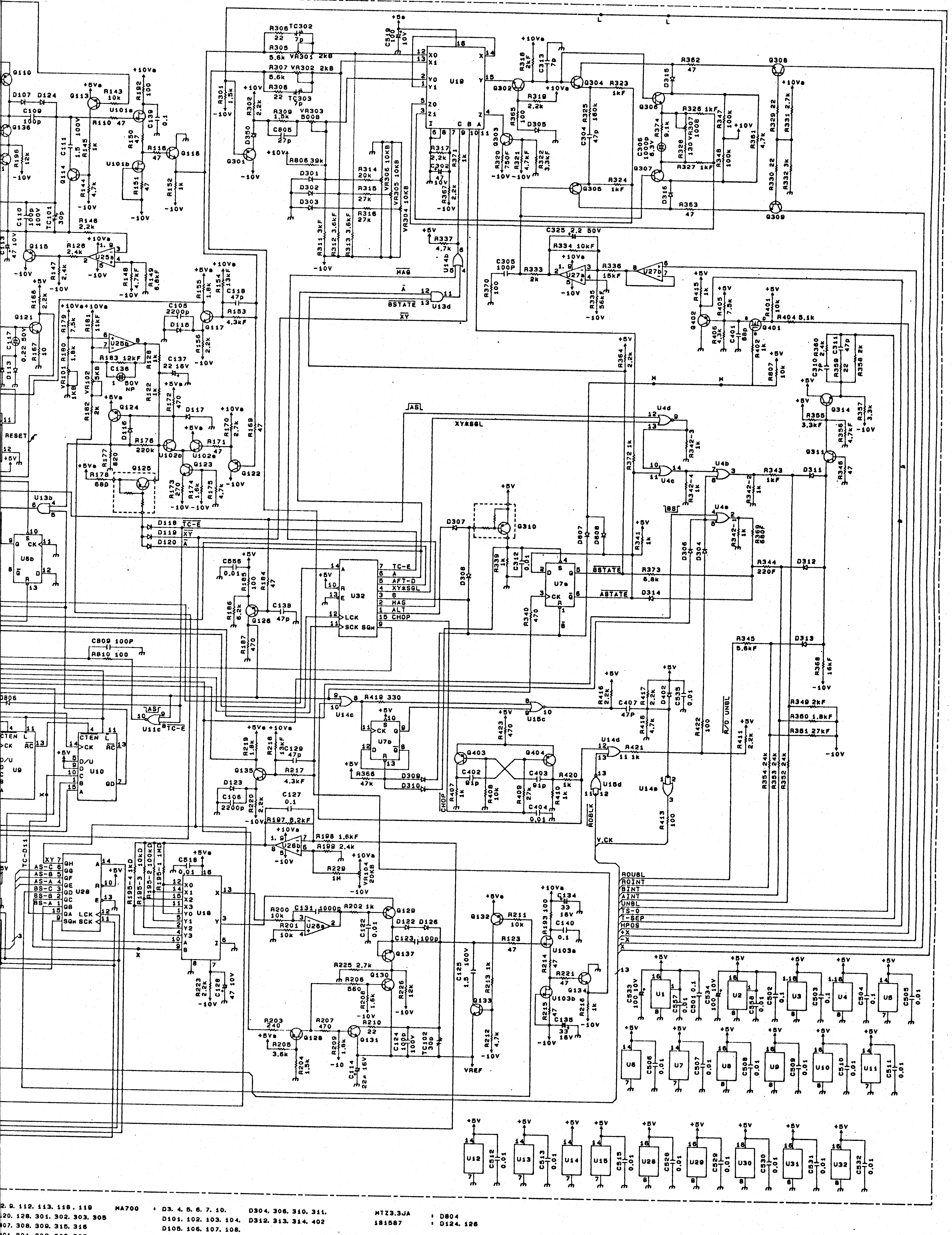
MC10H131L : U3
MC10H102L : U1. 2
MC10103L : U4
MC14052BCP : U16. 17. 18
MC74HC4053AN : U19
SN74ALS02N : U11. 15
SN74ALS08N : U13
SN74ALS32N : U12. 14
SN74ALS74AN : U5. 6. 7
SN74ALS191N : U8. 9. 10
NJM072S : U21. 22. 24. 25. 26.27
HD74HC595AP : U28. 29. 30. 31. 32
2SC3066 (F) : U102
2SK332 (E) : U101. 103

2SA1005 (K) : Q109. 128. 403. 404
2SA1174 (E. F) : Q110. 129
2SA1175 (F) : Q113. 115. 119. 132
Q301. 402. 405
2SA1206 : Q5. 7. 17. 19. 103. 122
Q124. 126. 127

2SA1565 : Q3. 16. 125. 310 . 9
2SC2785 (F) : Q8. 20. 104. 118.
Q120. 302. 406. 801
2SC3316 (C) : Q114. 117. 123. 133.
Q135. 303~309
2SC3354 (B. T) : Q116. 134. 311. 314

2SC3732 (L) : Q111. 112. 121. 130
Q131. 136. 137
2SC3779 (D) : Q1. 2. 6. 14. 15. 18
2SC4049 : Q101. 105. 106. 107
2SK583 : Q401
2SK304 (F) : Q4. 10

1SS132 : D 2. 9. 11
D120. 128
D307. 308
D401. 801
D806. 807

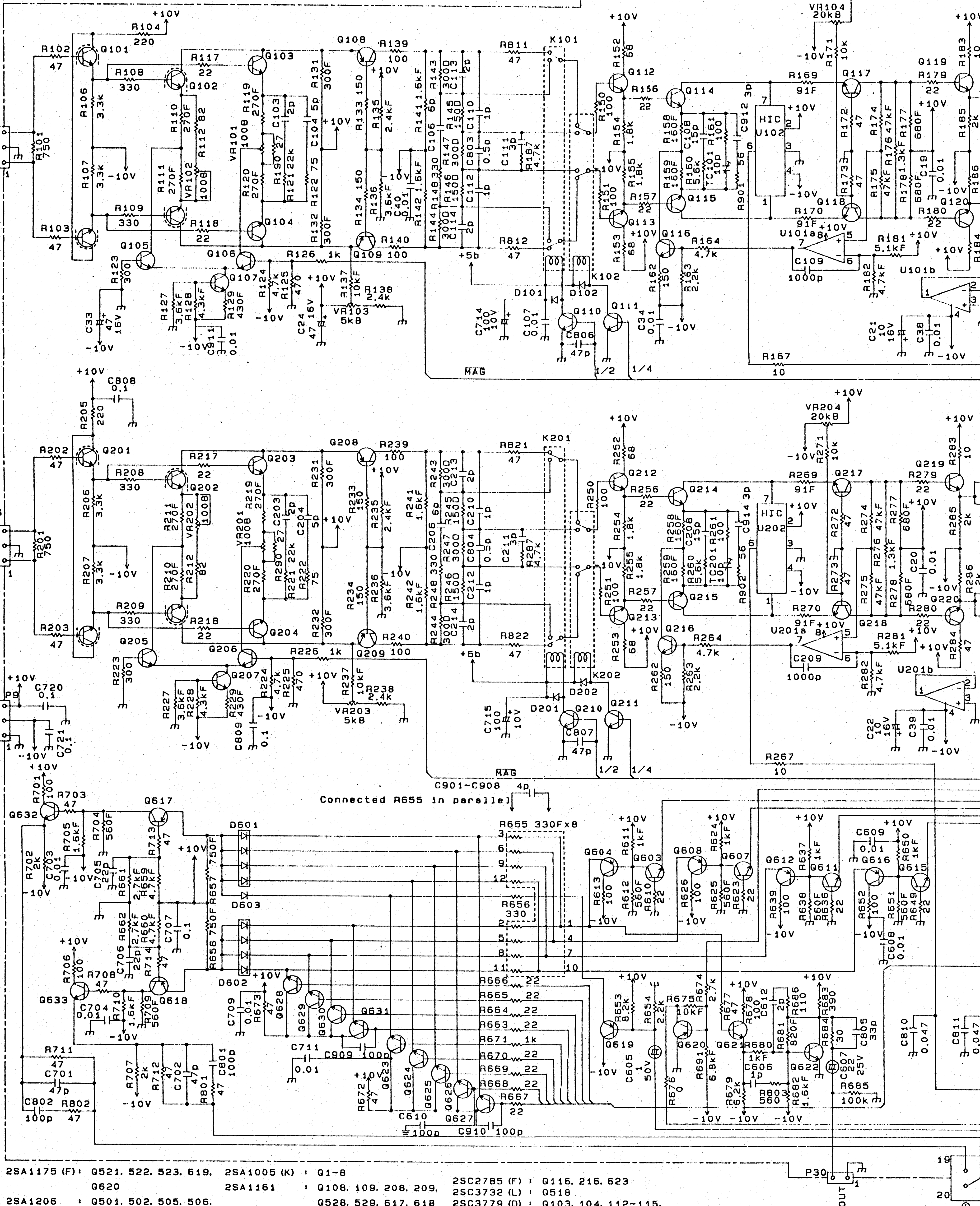


RESET
TC-E
XY
ASL
XY&SGL
BSTATE
ASTATE
MAG
CHOP
AFT-D
ALT
BS
ASF
R/O UNBL
ROBLK
V.CK
ROUBL
ROINT
BINT
AINT
UNBL
TS-O
T-SEP
HPOS
+X
-X
X
VREF
U19
U32
U18
U28
U9
U10
U6b
U7a
U7b

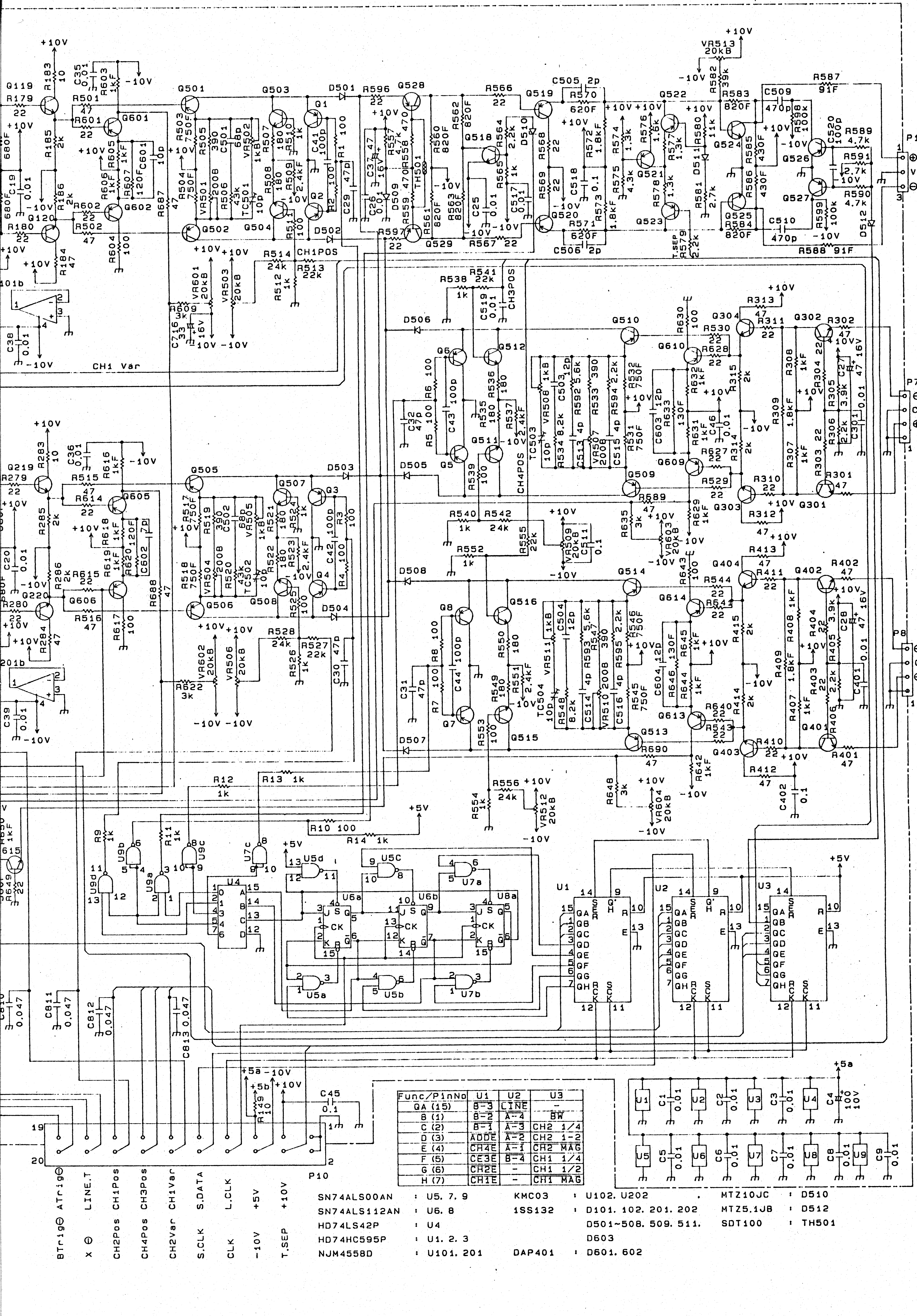
2. 9. 112. 113. 118 . 119 MA700 : D3. 4. 5. 6. 7. 10. D304. 306. 310. 311.
20. 128. 301. 302. 303. 305 D101. 102. 103. 104. D312. 313. 314. 402
07. 308. 309. 315. 316 D105. 106. 107. 108.
01. 801. 802. 803. 805 D109. 110. 111. 115.
06. 807. 808 D116. 117. 122. 123.

MTZ3.3JA : D804
1S1587 : D124. 126

VERTICAL PREAMP UNIT (X73-1760-01)


P5
CH1
P6
CH2
P9
ATT.P
P30
CH1 OUT
BTrig⊕
ATrig⊕
+10V
-10V
+5b
MAG
1/2
1/4
K101
K102
K201
K202
HIC U102
HIC U202
U101a
U101b
U201a
U201b
VR101 1008
VR102
VR103 5k8
VR104 20k8
VR201 1008
VR202
VR203 5k8
VR204 20k8
D101
D102
D201
D202
D601
D602
D603
C901~C908 4p
Connected R655 in parallel
R655 330F×8
R656 330

2SA1175 (F) :	Q521. 522. 523. 619. Q620
2SA1206 :	Q501. 502. 505. 506. Q509. 510. 513. 514. Q519. 520. 526. 527. Q601. 602. 604. 605. Q606. 608. 609. 610. Q612. 613. 614. 616
2SA1005 (K) :	Q1~8
2SA1161 :	Q108. 109. 208. 209. Q528. 529. 617. 618
2SC3315 (C) :	Q105. 106. 107. 205. Q206. 207. 503. 504. Q507. 508. 511. 512. Q515. 516. 624. 625. Q626. 627. 628. 629. Q630. 631
2SC2785 (F) :	Q116. 216. 623
2SC3732 (L) :	Q518
2SC3779 (D) :	Q103. 104. 112~115. Q117~120. 203. 204. Q212~215. 217~220. Q301~304. 401~404. Q524. 525. 603. 607. Q611. 615. 621. 622. Q632. 633
2SC4049 :	Q110. 111. 210. 211
2SC4072 :	Q101. 102. 201. 202


P11
V.OUT
P7
CH3
P8
CH4
CH1 Var
CH1POS
CH3POS
CH4POS
T.SEP
P10
U1
U2
U3
U4
U6a
U6b
U8a
BTrig⊖ ATrig⊖
x ⊖ LINE.T
CH2Pos CH1Pos
CH4Pos CH3Pos
CH2Var CH1Var
S.CLK S.DATA
CLK L.CLK
-10V +5V
T.SEP +10V
+5a
+10V
-10V
+5V

Func/PinNo	U1	U2	U3
QA (15)	$\overline{\text{B-3}}$	LINE	-
B (1)	$\overline{\text{B-2}}$	$\overline{\text{A-4}}$	BW
C (2)	$\overline{\text{B-1}}$	$\overline{\text{A-3}}$	CH2 1/4
D (3)	$\overline{\text{ADDE}}$	$\overline{\text{A-2}}$	CH2 1-2
E (4)	$\overline{\text{CH4E}}$	$\overline{\text{A-1}}$	$\overline{\text{CH2 MAG}}$
F (5)	$\overline{\text{CE3E}}$	$\overline{\text{B-4}}$	CH1 1/4
G (6)	$\overline{\text{CH2E}}$	-	CH1 1/2
H (7)	$\overline{\text{CH1E}}$	-	$\overline{\text{CH1 MAG}}$

SN74ALS00AN : U5. 7. 9
SN74ALS112AN : U6. 8
HD74LS42P : U4
HD74HC595P : U1. 2. 3
NJM4558D : U101. 201

KMC03 : U102. U202
1SS132 : D101. 102. 201. 202
D501~508. 509. 511.
D603
DAP401 : D601. 602

MTZ10JC : D510
MTZ5.1JB : D512
SDT100 : TH501

*** PARTS LIST ***

Y70-1700-00(CS-6040 UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION
	A01-1194-12	CASE,TOP
	A01-1195-32	CASE,BOTTOM
	A13-0924-12	FRAME,RIGHT
	A13-0925-22	FRAME,CENTER
	A13-0926-22	FRAME,LEFT
	A13-0927-13	FRAME,PCB SUPPORT
	A13-0928-03	FRAME
	A13-0929-03	FRAME
	A20-2828-32	PANEL ASS'Y
	A20-2830-32	MOLDED PANEL ASS'Y
	A21-1136-03	DECORATIVE PANEL
	A21-1173-03	DECORATIVE PANEL
	A23-1683-22	REAR PANEL
	B07-0703-04	ESCUTCHEON FOR ASTIG
	B11-0504-14	FILTER
	B30-0925-05	LAMP
	B30-0979-05	LAMP ASS'Y;SCALE ILLUMINATION
	B40-2935-03	NAME PLATE,MODEL
	B41-0710-04	CAUTION LABEL (HIGH VOLTAGE)
	B41-0874-04	SERIAL NO. PLATE
	B50-7670-20	INSTRUCTION MANUAL,JAPANESE
	B50-7671-20	INSTRUCTION MANUAL,ENGLISH
	CC45CH2H330J	CAP. CERAMIC 33P 5% 500V
	D19-0505-05	FLEXIBLE WIRE,FOR POWER SWITCH
	E01-1404-05	CRT SOCKET
	E04-0259-05	BNC RECEPTACLE
	E18-0365-05	AC SELECTOR WITH 6X30MM FUSE
	E18-0366-15	AC SELECTOR WITH 5X20MM FUSE
	E21-0660-04	TERMINAL,CAL
	E21-0667-05	METAL TERMINAL
	E23-0565-05	EARTH WASHER
	E23-0567-04	EARTH BRACKET;COPPER
	E30-1644-15	BS POWER CORD
	E30-1818-05	JIS POWER CORD
	E30-1819-05	CEE POWER CORD
	E30-1820-05	UL/CSA POWER CORD
	E30-1821-05	SAA POWER CORD
	E31-0717-25	WIRE ASS'Y;INLET TO GND
	E31-5560-05	WIRE ASS'Y(NO.23)
	E31-5568-05	FLAT CABLE(AXM126)
	E31-5569-05	FLAT CABLE(AXM120)
	E38-0068-05	WIRE ASS'Y;PROG. STEP INPUT
	E38-0069-05	WIRE ASS'Y;P37
	E38-0075-05	WIRE ASS'Y(NO.14)
	E38-0076-05	WIRE ASS'Y(NO.15)
	E38-0077-05	WIRE ASS'Y;P24
	E38-0078-05	WIRE ASS'Y;Z.AXIS INPUT
	E38-0079-05	WIRE ASS'Y;CH1 OUTPUT
	E38-0080-05	WIRE ASS'Y(NO.25)
	E38-0081-05	WIRE ASS'Y(NO.26)
	E38-0082-05	WIRE ASS'Y;CAL
	E38-0083-05	WIRE ASS'Y;P4
	F05-1224-05	FUSE 1.2A(6X30MM) FOR 100/120V
	F05-8013-05	FUSE 0.8A(5X20MM) FOR 220/240V
	F05-8015-05	FUSE(6X30MM) 0.8A
	F07-0936-04	COVER ,HANDLE LATCH
	F10-1604-04	SHIELD,R/O UNIT
	F10-1605-13	SHIELD PLATE
	F10-1606-03	SHIELD,HIGH VOLTAGE UNIT

* * * PARTS LIST * * *

Y70-1700-00

REF.NO	PARTS NO	NAME & DESCRIPTION
	F11-1209-02	SHIELD,CRT:FRONT
	F11-1210-03	SHIELD,CRT:REAR
	F15-0733-04	FELT (CRT SHIELD)
	F20-0673-04	INSULATED SHEET
	F20-0674-04	INSULATED SHEET,HIGH VOLTAGE
	G02-0606-14	SPRING,FOR HANDLE
	G53-0015-14	BUSHING
	H10-2901-02	FOAMED STYRENE PAD,FRONT
	H10-2902-12	FOAMED STYRENE PAD,REAR
	H20-1727-04	VINYL COVER
	H53-0031-04	CARTON BOX
	J02-0089-05	RUBBER FOOT(REAR)
	J11-0508-05	CABLE CLAMP
	J19-1656-03	HOLDER,COIL
	J19-1657-04	WEDGE
	J19-1660-05	SUPPORT,FOR PCB
	J21-2906-05	GEAR,FOR HANDLE
	J21-2907-05	RING,FOR HANDLE
	J21-4613-04	BRACKET
	J21-4642-04	BRACKET
	J21-4710-04	BRACKET
	J31-0604-04	SPACER
	J32-0887-04	BOSS,FOR POWER SWITCH
	J59-0403-05	NYLON RIVET (ILLUMI)
	J61-0408-05	WIRE WRAPPING BAND
	J61-0509-05	WIRE WRAPPING BAND
	J61-0516-05	SUPPORT
	J61-0521-05	SUPPORT
	K01-0528-05	HANDLE,CARRYING
	K21-0898-23	KNOB,VOLT/DIV,SWEEP TIME/DIV
	K23-0808-03	KNOB(18 USED)
	K27-0504-04	BUTTON;GRAY
	K27-0543-04	KNOB,PUSH(34 USED)
	L01-9766-05	POWER TRANSFORMER
	L39-0533-05	COIL,TRACE ROTATION
	L76-0120-05	DELAY LINE
	RD14BB2C471J	RES. CARBON 470 5% 1/6W
	S40-1524-05	PUSH SWITCH,POWER
	W01-0503-04	REAR RUBBER FOOT/CORD WRAP
	W03-2301-15	R/O PROBE, PC-31
	X66-1050-01	PANEL UNIT
	X68-1500-01	POWER SUPPLY UNIT
	X68-1510-02	HIGH VOLTAGE UNIT
	X69-1150-02	SWITCH UNIT
	X73-1760-01	VERTICAL PREAMP UNIT
	X74-1480-02	HORIZONTAL UNIT
	X75-1180-01	ATT. UNIT
	X76-1400-00	LINE COUNTER UNIT
	X77-1490-01	R/O UNIT
	X77-1500-01	CONNECTION UNIT
	X80-1100-02	FINAL UNIT
	X81-2330-02	VR UNIT
	150XTM31A	CRT

*** PARTS LIST ***

X66-1050-01 (PANEL UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION
	J61-0529-05	SUPPORT
	J73-0011-13	PCB (UNMOUNTED)
	N09-0739-05	SCREW, SEMS TAPTITE 3X8
	N19-0713-05	WASHER
C1	C91-0757-05	CAP. CERAMIC 1000P 10% 50V
C2	C91-0757-05	CAP. CERAMIC 1000P 10% 50V
C3	C91-0757-05	CAP. CERAMIC 1000P 10% 50V
C4	C91-0757-05	CAP. CERAMIC 1000P 10% 50V
C5	C91-0757-05	CAP. CERAMIC 1000P 10% 50V
C6	C91-0757-05	CAP. CERAMIC 1000P 10% 50V
C7	C91-0757-05	CAP. CERAMIC 1000P 10% 50V
C8	C91-0757-05	CAP. CERAMIC 1000P 10% 50V
D1	MA700	DIODE
D2	MA700	DIODE
D3	1SS132	DIODE
J31	E31-5555-05	LEAD WIRE WITH CONNECTOR
P2	E40-7038-05	PIN CONNECTOR 26P
Q1	2SC2785(F)	TR. SI, NPN
Q2	2SA1175(F)	TR. SI, PNP
Q3	2SC2785(F)	TR. SI, NPN
Q4	2SA1175(F)	TR. SI, PNP
Q5	NO USE	
Q6	2SC2785(F)	TR. SI, NPN
Q7	2SC2785(F)	TR. SI, NPN
R1	RN14BK2C2202F	RES. METAL FILM 22K 1% 1/6W
R2	RN14BK2C9103F	RES. METAL FILM 910K 1% 1/6W
R3	RN14BK2C9103F	RES. METAL FILM 910K 1% 1/6W
R4	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R5	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R6	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R7	RN14BK2C2202F	RES. METAL FILM 22K 1% 1/6W
R8	RN14BK2C9103F	RES. METAL FILM 910K 1% 1/6W
R9	RN14BK2C9103F	RES. METAL FILM 910K 1% 1/6W
R10	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R11	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R12	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R13	RN14BK2C6801F	RES. METAL FILM 6.8K 1% 1/6W
R14	RN14BK2C1802F	RES. METAL FILM 18K 1% 1/6W
R15	RD14BB2E220J	RES. CARBON 22 5% 1/4W
R16	RN14BK2C2002F	RES. METAL FILM 20K 1% 1/6W
R17	RN14BK2C4303F	RES. METAL FILM 430K 1% 1/6W
R18	RN14BK2C5102F	RES. METAL FILM 51K 1% 1/6W
R19	RN14BK2C3003F	RES. METAL FILM 300K 1% 1/6W
R20	RN14BK2C4702F	RES. METAL FILM 47K 1% 1/6W
R21	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R22	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R23	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W
U1	NJM4558D	IC, DUAL OP AMP
VR1	R05-3525-15	V.R. 20K B
VR2	R05-3525-15	V.R. 20K B
VR3	R05-3525-15	V.R. 20K B
VR4	R05-3525-15	V.R. 20K B

*** PARTS LIST ***

X66-1050-01

REF.NO	PARTS NO	NAME & DESCRIPTION	
VR5	R05-3525-15	V.R.	20K B
VR6	R05-3525-15	V.R.	20K B
VR7	R05-3525-15	V.R.	20K B
VR8	R05-3525-15	V.R.	20K B
VR9	R05-3525-15	V.R.	20K B
VR10	R05-3525-15	V.R.	20K B
VR11	R10-3504-15	ENDLESS VOLUME	2X10K B
VR12	R10-3504-15	ENDLESS VOLUME	2X10K B
VR13	R10-3504-15	ENDLESS VOLUME	2X10K B
VR14	R05-3525-15	V.R.	20K B

*** PARTS LIST ***

X68-1500-01 (POWER SUPPLY UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	F01-0865-14	HEAT SINK			
	J25-5227-13	PCB (UNMOUNTED)			
	N09-0731-05	SCREW	M3X12		
	N14-0626-04	NUT			
	N17-1030-41	LOCK WASHER	M3		
	N30-3008-41	SCREW, PAN HD	M3X8		
C1	CE04W2E4R7M	CAP. ELECTRO	4.7	20%	250V
C2	CE04EW2A220M	CAP. ELECTRO	22	20%	100V
C3	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C4	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C5	CE04EW1E101M	CAP. ELECTRO	100	20%	25V
C6	CE04EW1A102M	CAP. ELECTRO	1000	20%	10V
C7	CE04W2E470M	CAP. ELECTRO	47	20%	250V
C8	CE04EW2A471M	CAP. ELECTRO	470	20%	100V
C9	C90-0973-05	CAP. ELECTRO	6800	20%	25V
C10	C90-0973-05	CAP. ELECTRO	6800	20%	25V
C11	C90-0982-05	CAP. ELECTRO	10000	20%	16V
C12	CE04BW1H010M	CAP. ELECTRO	1	20%	50V
C13	CE04EW1H331M	CAP. ELECTRO	330	20%	50V
C14	CE04EW1V471M	CAP. ELECTRO	470	20%	35V
C15	CE04EW1E101M	CAP. ELECTRO	100	20%	25V
C16	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C17	NO USE				
C18	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C19	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D3	MTZ13JB	DIODE, ZENER	12.88V		
D4	MTZ13JB	DIODE, ZENER	12.88V		
D5	MTZ5.1JB	DIODE, ZENER	5.07V		
D6	S1VB60	DIODE			
D7	S1VB60	DIODE			
D8	S4VB40F	DIODE, BRIDGE			
D9	S4VB40F	DIODE, BRIDGE			
D10	1SR35-200A	DIODE			
D11	1SR35-200A	DIODE			
D12	MTZ20JC	DIODE, ZENER	19.73V		
D13	MTZ7.5JA	DIODE, ZENER	7.04V		
P17	E40-5068-05	PIN CONNECTOR	11P		
P18	E40-7040-05	PIN CONNECTOR	13P		
Q1	2SD1409	TR, SI, NPN			
Q2	2SC2271(D)	TR. SI, NPN			
Q3	2SD1409	TR, SI, NPN			
Q4	2SC2271(D)	TR. SI, NPN			
Q5	2SB1133(S)	TR. SI, PNP			
Q6	2SD1666(S)	TR. SI, NPN			
Q7	2SB1133(S)	TR. SI, PNP			
Q8	2SA684(Q)	TR. SI, PNP			
R1	RN14BK2C1302F	RES. METAL FILM	13K	1%	1/6W
R2	RN14BK2C1803F	RES. METAL FILM	180K	1%	1/6W
R3	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R4	RN14BK2C2002F	RES. METAL FILM	20K	1%	1/6W
R5	RN14BK2C1203F	RES. METAL FILM	120K	1%	1/6W
R6	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R7	RN14BK2C2002F	RES. METAL FILM	20K	1%	1/6W

*** PARTS LIST ***

X68-1500-01

REF.NO	PARTS NO	NAME & DESCRIPTION			
R8	RN14BK2C2002F	RES. METAL FILM	20K	1%	1/6W
R9	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R10	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R11	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R12	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R13	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R14	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R15	RN14BK2C2002F	RES. METAL FILM	20K	1%	1/6W
R16	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R17	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R18	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R19	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R20	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R21	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R22	NO USE				
R23	RD14BB2C362J	RES. CARBON	3.6K	5%	1/6W
R24	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
R25	R92-1402-05	RES. SPECIAL POWER	24	5%	2W
R26	NO USE				
R27	R92-1402-05	RES. SPECIAL POWER	24	5%	2W
R28	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R29	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R30	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R31	R92-1421-05	RES. SPECIAL POWER	7.5	5%	3W
R32	RN14BK2C1502F	RES. METAL FILM	15K	1%	1/6W
R33	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R34	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R35	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R36	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R901	RD14BB2C331J	RES. CARBON	330	5%	1/6W
U1	NJM4556S	IC,DUAL OP AMP			
U2	NJM4556S	IC,DUAL OP AMP			
U3	NJM4556S	IC,DUAL OP AMP			
VR1	R12-1551-05	RES. SEMI FIXED	1KB		

*** PARTS LIST ***

X68-1510-02 (HIGH VOLTAGE UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	F01-0813-05	HEAT SINK (CONVERTER)			
	F10-1601-04	SHIELD PLATE			
	F15-0727-04	HOLDER (NEON LAMP)			
	J25-5226-13	PCB (UNMOUNTED)			
	N30-3006-41	SCREW, PAN HD	M3X6		
C1	CE04EW1E221M	CAP. ELECTRO	220	20%	25V
C2	CE04EW1E221M	CAP. ELECTRO	220	20%	25V
C3	CK45B1H472K	CAP. CERAMIC	4700P	10%	50V
C4	CK45FB1H222K	CAP. CERAMIC	2200P	10%	50V
C5	CC45SL2H101J	CAP. CERAMIC	100P	5%	500V
C6	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C7	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C8	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C9	CK45B2H102K	CAP. CERAMIC	1000P	10%	500V
C10	CF92V1H224J	CAP. POLYESTER	0.22	5%	50V
C11	CF92V1H224J	CAP. POLYESTER	0.22	5%	50V
C12	CK45E3F102P	CAP. CERAMIC	1000P		3.1K
C13	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C14	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C15	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C16	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C17	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C18	CK45B2H102K	CAP. CERAMIC	1000P	10%	500V
C19	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C20	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C21	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
C22	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
C23	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C24	CC45CH2H020C	CAP. CERAMIC	2P	0.25P	500V
C25	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
C26	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C27	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C31	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C32	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C33	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C34	C91-1274-05	CAP. CERAMIC	2700P	10%	3.15K
C35	CE04W2C2R2M	CAP. ELECTRO	2.2	20%	160V
C36	CE04W2C2R2M	CAP. ELECTRO	2.2	20%	160V
C37	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C38	CE04EW1C101M	CAP. ELECTRO	100	20%	16V
C39	CE04EW1C101M	CAP. ELECTRO	100	20%	16V
C40	CE04EW1C101M	CAP. ELECTRO	100	20%	16V
C43	CE04EW0J102M	CAP. ELECTRO	1000	20%	6.3V
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D3	1SS132	DIODE			
D4	1SR35-200A	DIODE			
D5	1SR35-200A	DIODE			
D6	1SS83	DIODE			
D7	1SS83	DIODE			
D8	1SR35-200A	DIODE			
D9	1SR35-200A	DIODE			
D10	1SS83	DIODE			
D11	1SS132	DIODE			
D12	1SS132	DIODE			
D13	1SS83	DIODE			

*** PARTS LIST ***

X68-1510-02

REF.NO	PARTS NO	NAME & DESCRIPTION			
L1	L40-3925-04	FERRI INDUCTOR	3.9MH		
L2	L40-1011-04	FERRI INDUCTOR	100UH		
L3	L40-1011-04	FERRI INDUCTOR	100UH		
L4	L40-1545-06	FERRI INDUCTOR	150MH		
NL1	NE-2B	NEON LAMP			
NL2	NE-2B	NEON LAMP			
NL3	NE-2B	NEON LAMP			
NL4	NE-2B	NEON LAMP			
P19	E40-5069-05	PIN CONNECTOR	12P		
P22	E40-3237-05	PIN CONNECTOR	2P		
P23	E40-0503-05	PIN CONNECTOR	5P		
P24	E40-3238-05	PIN CONNECTOR	3P		
P25	E40-3239-05	PIN CONNECTOR	4P		
P26	E40-5067-05	PIN CONNECTOR	10P		
Q1	2SD613(E)	TR. SI, NPN			
Q2	2SA1175(F)	TR. SI, PNP			
Q3	2SA1208(S,T)	TR. SI, PNP			
Q4	2SC2910(S,T)	TR. SI, NPN			
Q5	2SA1209(S,T)	TR. SI, PNP			
Q6	2SC2911(S,T)	TR. SI, NPN			
Q7	2SA1175(F)	TR. SI, PNP			
Q8	2SC3315(C)	TR. SI, NPN			
R1	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R2	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R3	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R4	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R5	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R6	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R7	R92-1128-05	RES. FIXED	9.1M	1%	1W
R8	R92-1128-05	RES. FIXED	9.1M	1%	1W
R9	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R10	R92-1034-05	RES. METAL FILM	47M	5%	1/2W
R11	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R12	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R13	R92-1034-05	RES. METAL FILM	47M	5%	1/2W
R14	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R15	RD14BB2C823J	RES. CARBON	82K	5%	1/6W
R16	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R17	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
R18	RD14BB2C114J	RES. CARBON	110K	5%	1/6W
R19	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R20	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R21	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R22	RD14BB2C134J	RES. CARBON	130K	5%	1/6W
R23	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R24	RD14BB2C134J	RES. CARBON	130K	5%	1/6W
R25	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R26	RD14BB2C913J	RES. CARBON	91K	5%	1/6W
R27	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R28	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R29	RD14BB2C133J	RES. CARBON	13K	5%	1/6W
R30	RD14BB2C203J	RES. CARBON	20K	5%	1/6W

*** PARTS LIST ***

X68-1510-02

REF.NO	PARTS NO	NAME & DESCRIPTION
R34	R92-1050-05	RES. METAL FILM 5.1M 5% 1/2W
R35	R92-1422-05	RES. FIXED 3.9M 5% 1/2W
R36	RD14BB2C203J	RES. CARBON 20K 5% 1/6W
R37	RN14BK2E1804F	RES. METAL FILM 1.8M 1% 1/4W
R38	NO USE	
R39	RD14BB2C204J	RES. CARBON 200K 5% 1/6W
R40	RD14BB2C684J	RES. CARBON 680K 5% 1/6W
R41	RD14BB2C684J	RES. CARBON 680K 5% 1/6W
R42	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R43	RD14BB2C6R8J	RES. CARBON 6.8 5% 1/6W
R44	R92-1126-05	RES. FIXED 4.3M 5% 1/2W
R47	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R48	RD14BB2C101J	RES. CARBON 100 5% 1/6W
U1	NJM4558D	IC.DUAL OP AMP
VR1	R12-5524-05	RES. SEMI FIXED 100K B
VR2	R12-8501-05	RES. SEMI FIXED 2.2M B
W1	W02-0458-05	HIGH VOLTAGE UNIT

* * * PARTS LIST * * *

X69-1150-02 (SWITCH UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J73-0012-03	PCB (UNMOUNTED)			
C4	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C5	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C6	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C7	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C8	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C9	CK45F1H103Z	CAP. CERAMIC	0.01		50V
D38	B30-0964-05	LED			
D39	B30-0965-05	LED			
D40	B30-0964-05	LED			
D41	B30-0965-05	LED			
D42	B30-0964-05	LED			
D43	B30-0965-05	LED			
D44	B30-0965-05	LED			
D45	1SS132	DIODE			
D46	1SS132	DIODE			
D47	1SS132	DIODE			
D48	1SS132	DIODE			
D49	1SS132	DIODE			
P1	E40-7036-05	PIN CONNECTOR	20P		
P37	E40-3237-05	PIN CONNECTOR	2P		
R15	R90-0652-05	RES. NETWORK	6X10K	5%	
R16	R90-0653-05	RES. NETWORK	8X10K	5%	
R17	R90-0614-05	RES. NETWORK	8X390	5%	
R18	R90-0639-05	RES. NETWORK	6X390	5%	
R19	R90-0639-05	RES. NETWORK	6X390	5%	
R20	R90-0639-05	RES. NETWORK	6X390	5%	
R21	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R22	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R23	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R24	RD14BB2C391J	RES. CARBON	390	5%	1/6W
S1	W02-0497-05	ROTARY ENCORDER			
S2	W02-0497-05	ROTARY ENCORDER			
S3	W02-0497-05	ROTARY ENCORDER			
S4	S40-2525-05	SWITCH			
S5	S40-2525-05	SWITCH			
S6	S40-2525-05	SWITCH			
S7	S40-2525-05	SWITCH			
S8	S40-2525-05	SWITCH			
S9	S40-2525-05	SWITCH			
S10	S40-2525-05	SWITCH			
S11	S40-2525-05	SWITCH			
S12	S40-2525-05	SWITCH			
S13	S40-2525-05	SWITCH			
S14	S40-2525-05	SWITCH			
S15	S40-2525-05	SWITCH			
S16	S40-2525-05	SWITCH			
S17	S40-2525-05	SWITCH			
S18	S40-2525-05	SWITCH			
S19	S40-2525-05	SWITCH			
S20	S40-2525-05	SWITCH			
S21	S40-2525-05	SWITCH			
S22	S40-2525-05	SWITCH			
S23	S40-2525-05	SWITCH			

*** PARTS LIST ***

X69-1150-02

REF.NO	PARTS NO	NAME & DESCRIPTION
S24	S40-2525-05	SWITCH
S25	S40-2525-05	SWITCH
S26	S40-2525-05	SWITCH
S27	S40-2525-05	SWITCH
S28	S40-2525-05	SWITCH
S29	S40-2525-05	SWITCH
S30	S40-2525-05	SWITCH
S31	S40-2525-05	SWITCH
S32	S40-2525-05	SWITCH
S33	S40-2525-05	SWITCH
S34	S40-2525-05	SWITCH
S35	S40-2525-05	SWITCH
S36	S40-2525-05	SWITCH
S37	S40-2525-05	SWITCH
U2	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U3	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U4	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U5	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U6	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U7	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U8	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U9	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH

*** PARTS LIST ***

X73-1760-01 (VERTICAL PREAMP UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E31-5576-05	WIRE ASS'Y(GND TO GND)			
	E31-5577-05	WIRE ASS'Y(NO.A,B,C,D)			
	E38-0089-05	WIRE ASS'Y;P7,8			
	F07-0949-04	COVER			
	J61-0408-05	WIRE WRAPPING BAND			
	J73-0010-02	PCB (UNMOUNTED)			
C1	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C2	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C3	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C4	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C5	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C6	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C7	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C8	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C9	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C19	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C20	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C21	CE04EW1C100M	CAP. ELECTRO	10	20%	16V
C22	CE04EW1C100M	CAP. ELECTRO	10	20%	16V
C23	NO USE				
C24	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C25	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C26	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C27	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C28	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C29	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C30	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C31	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C32	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C33	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C34	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C35	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C36	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C37	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C38	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C39	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C40	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C41	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C42	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C43	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C44	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C45	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C46	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C103	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C104	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C105	NO USE				
C106	CC45FCH1H060D	CAP. CERAMIC	6P	0.5P	50V
C107	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C108	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C109	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C110	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C111	CC45FCH1H030C	CAP. CERAMIC	3P	0.25P	50V
C112	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C113	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C114	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C203	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V

* * * PARTS LIST * * *

X73-1760-01

REF.NO	PARTS NO	NAME & DESCRIPTION				
C204	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C205	NO USE				
C206	CC45FCH1H060D	CAP. CERAMIC	6P	0.5P	50V
C207	NO USE				
C208	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C209	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C210	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C211	CC45FCH1H030C	CAP. CERAMIC	3P	0.25P	50V
C212	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C213	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C214	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C301	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C401	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C402	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C501	CC45FCH1H680J	CAP. CERAMIC	68P	5%	50V
C502	CC45FCH1H680J	CAP. CERAMIC	68P	5%	50V
C503	CC45CH1H120J	CAP. CERAMIC	12P	5%	50V
C504	CC45CH1H120J	CAP. CERAMIC	12P	5%	50V
C505	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C506	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C509	CC45SL1H471J	CAP. CERAMIC	470P	5%	50V
C510	CC45SL1H471J	CAP. CERAMIC	470P	5%	50V
C511	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C512	NO USE				
C513	CC45FCH1H040C	CAP. CERAMIC	4P	0.25P	50V
C514	CC45FCH1H040C	CAP. CERAMIC	4P	0.25P	50V
C515	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C516	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C517	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C518	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C519	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C520	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C601	CC45FCH1H100D	CAP. CERAMIC	10P	0.5P	50V
C602	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C603	CC45FCH1H120J	CAP. CERAMIC	12P	5%	50V
C604	CC45FCH1H120J	CAP. CERAMIC	12P	5%	50V
C605	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C606	CC45CH1H010C	CAP. CERAMIC	1P	0.25P	50V
C607	CE04HW1E220M	CAP. ELECTRO	22	20%	25V
C608	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C609	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C610	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C611	NO USE				
C612	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C701	CC45CH1H470J	CAP. CERAMIC	47P	5%	50V
C702	CC45CH1H470J	CAP. CERAMIC	47P	5%	50V
C703	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C704	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C705	CC45FCH1H220J	CAP. CERAMIC	22P	5%	50V
C706	CC45FCH1H220J	CAP. CERAMIC	22P	5%	50V
C707	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C708	NO USE				
C709	CK45FF1H103Z	CAP. CERAMIC	0.01		50V

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
C710	NO USE				
C711	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C714	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C715	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C716	CE04EW1C330M	CAP. ELECTRO	33	20%	16V
C720	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C721	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C801	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C802	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C803	CC45CH1H0R5C	CAP. CERAMIC	0.5P	0.25P	50V
C804	CC45CH1H0R5C	CAP. CERAMIC	0.5P	0.25P	50V
C805	CC45CH1H330J	CAP. CERAMIC	33P	5%	50V
C806	CC45SL1H470J	CAP. CERAMIC	47P	5%	50V
C807	CC45SL1H470J	CAP. CERAMIC	47P	5%	50V
C808	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C809	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C810	CQ92FM1H473K	CAP. MYLAR	0.047	10%	50V
C811	CQ92FM1H473K	CAP. MYLAR	0.047	10%	50V
C812	CQ92FM1H473K	CAP. MYLAR	0.047	10%	50V
C813	CQ92FM1H473K	CAP. MYLAR	0.047	10%	50V
C901	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C902	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C903	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C904	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C905	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C906	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C907	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C908	CC45CH1H040C	CAP. CERAMIC	4P	0.25P	50V
C909	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C910	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C911	CQ92M1H103K	CAP. MYLAR	0.01	10%	50V
C912	CC45CH1H030C	CAP. CERAMIC	3P	0.25P	50V
C913	CC45CH1H030C	CAP. CERAMIC	3P	0.25P	50V
D101	1SS132	DIODE			
D102	1SS132	DIODE			
D201	1SS132	DIODE			
D202	1SS132	DIODE			
D501	1SS132	DIODE			
D502	1SS132	DIODE			
D503	1SS132	DIODE			
D504	1SS132	DIODE			
D505	1SS132	DIODE			
D506	1SS132	DIODE			
D507	1SS132	DIODE			
D508	1SS132	DIODE			
D509	1SS132	DIODE			
D510	MTZ10JC	DIODE, ZENER	9.95V		
D511	1SS132	DIODE			
D512	MTZ5.1JB	DIODE, ZENER	5.07V		
D601	DAP401	DIODE ARRAY			
D602	DAP401	DIODE ARRAY			

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION
D603	1SS132	DIODE
K101	S51-2508-05	RELAY
K102	S51-2508-05	RELAY
K201	S51-2508-05	RELAY
K202	S51-2508-05	RELAY
P5	E40-3238-05	PIN CONNECTOR 3P
P6	E40-3238-05	PIN CONNECTOR 3P
P9	E40-3238-05	PIN CONNECTOR 3P
P10	E40-7039-05	PIN CONNECTOR 20P
P11	E40-3238-05	PIN CONNECTOR 3P
P30	E40-3237-05	PIN CONNECTOR 2P
Q1	2SA1005(K)	TR. SI, PNP
Q2	2SA1005(K)	TR. SI, PNP
Q3	2SA1005(K)	TR. SI, PNP
Q4	2SA1005(K)	TR. SI, PNP
Q5	2SA1005(K)	TR. SI, PNP
Q6	2SA1005(K)	TR. SI, PNP
Q7	2SA1005(K)	TR. SI, PNP
Q8	2SA1005(K)	TR. SI, PNP
Q101	2SC4072	TR. SI, NPN
Q102	2SC4072	TR. SI, NPN
Q103	2SC3779(D)	TR. SI, NPN
Q104	2SC3779(D)	TR. SI, NPN
Q105	2SC3315(C)	TR. SI, NPN
Q106	2SC3315(C)	TR. SI, NPN
Q107	2SC3315(C)	TR. SI, NPN
Q108	2SA1161	TR. SI, PNP
Q109	2SA1161	TR. SI, PNP
Q110	2SC4049	TR. SI, NPN
Q111	2SC4049	TR. SI, NPN
Q112	2SC3779(D)	TR. SI, NPN
Q113	2SC3779(D)	TR. SI, NPN
Q114	2SC3779(D)	TR. SI, NPN
Q115	2SC3779(D)	TR. SI, NPN
Q116	2SC2785(F)	TR. SI, NPN
Q117	2SC3779(D)	TR. SI, NPN
Q118	2SC3779(D)	TR. SI, NPN
Q119	2SC3779(D)	TR. SI, NPN
Q120	2SC3779(D)	TR. SI, NPN
Q201	2SC4072	TR. SI, NPN
Q202	2SC4072	TR. SI, NPN
Q203	2SC3779(D)	TR. SI, NPN
Q204	2SC3779(D)	TR. SI, NPN
Q205	2SC3315(C)	TR. SI, NPN
Q206	2SC3315(C)	TR. SI, NPN
Q207	2SC3315(C)	TR. SI, NPN
Q208	2SA1161	TR. SI, PNP
Q209	2SA1161	TR. SI, PNP
Q210	2SC4049	TR. SI, NPN
Q211	2SC4049	TR. SI, NPN
Q212	2SC3779(D)	TR. SI, NPN

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REF.NO	PARTS NO	NAME & DESCRIPTION
Q213	2SC3779(D)	TR. SI, NPN
Q214	2SC3779(D)	TR. SI, NPN
Q215	2SC3779(D)	TR. SI, NPN
Q216	2SC2785(F)	TR. SI, NPN
Q217	2SC3779(D)	TR. SI, NPN
Q218	2SC3779(D)	TR. SI, NPN
Q219	2SC3779(D)	TR. SI, NPN
Q220	2SC3779(D)	TR. SI, NPN
Q301	2SC3779(D)	TR. SI, NPN
Q302	2SC3779(D)	TR. SI, NPN
Q303	2SC3779(D)	TR. SI, NPN
Q304	2SC3779(D)	TR. SI, NPN
Q401	2SC3779(D)	TR. SI, NPN
Q402	2SC3779(D)	TR. SI, NPN
Q403	2SC3779(D)	TR. SI, NPN
Q404	2SC3779(D)	TR. SI, NPN
Q501	2SA1206	TR. SI, PNP
Q502	2SA1206	TR. SI, PNP
Q503	2SC3315(C)	TR. SI, NPN
Q504	2SC3315(C)	TR. SI, NPN
Q505	2SA1206	TR. SI, PNP
Q506	2SA1206	TR. SI, PNP
Q507	2SC3315(C)	TR. SI, NPN
Q508	2SC3315(C)	TR. SI, NPN
Q509	2SA1206	TR. SI, PNP
Q510	2SA1206	TR. SI, PNP
Q511	2SC3315(C)	TR. SI, NPN
Q512	2SC3315(C)	TR. SI, NPN
Q513	2SA1206	TR. SI, PNP
Q514	2SA1206	TR. SI, PNP
Q515	2SC3315(C)	TR. SI, NPN
Q516	2SC3315(C)	TR. SI, NPN
Q517	NO USE	
Q518	2SC3732(L)	TR. SI, NPN
Q519	2SA1206	TR. SI, PNP
Q520	2SA1206	TR. SI, PNP
Q521	2SA1175(F)	TR. SI, PNP
Q522	2SA1175(F)	TR. SI, PNP
Q523	2SA1175(F)	TR. SI, PNP
Q524	2SC3779(D)	TR. SI, NPN
Q525	2SC3779(D)	TR. SI, NPN
Q526	2SA1206	TR. SI, PNP
Q527	2SA1206	TR. SI, PNP
Q528	2SA1161	TR. SI, PNP
Q529	2SA1161	TR. SI, PNP
Q601	2SA1206	TR. SI, PNP
Q602	2SA1206	TR. SI, PNP
Q603	2SC3779(D)	TR. SI, NPN
Q604	2SA1206	TR. SI, PNP
Q605	2SA1206	TR. SI, PNP
Q606	2SA1206	TR. SI, PNP
Q607	2SC3779(D)	TR. SI, NPN
Q608	2SA1206	TR. SI, PNP
Q609	2SA1206	TR. SI, PNP
Q610	2SA1206	TR. SI, PNP

* * * PARTS LIST * * *

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REF.NO	PARTS NO	NAME & DESCRIPTION			
Q611	2SC3779(D)	TR. SI, NPN			
Q612	2SA1206	TR. SI, PNP			
Q613	2SA1206	TR. SI, PNP			
Q614	2SA1206	TR. SI, PNP			
Q615	2SC3779(D)	TR. SI, NPN			
Q616	2SA1206	TR. SI, PNP			
Q617	2SA1161	TR. SI, PNP			
Q618	2SA1161	TR. SI, PNP			
Q619	2SA1175(F)	TR. SI, PNP			
Q620	2SA1175(F)	TR. SI, PNP			
Q621	2SC3779(D)	TR. SI, NPN			
Q622	2SC3779(D)	TR. SI, NPN			
Q623	2SC2785(F)	TR. SI, NPN			
Q624	2SC3315(C)	TR. SI, NPN			
Q625	2SC3315(C)	TR. SI, NPN			
Q626	2SC3315(C)	TR. SI, NPN			
Q627	2SC3315(C)	TR. SI, NPN			
Q628	2SC3315(C)	TR. SI, NPN			
Q629	2SC3315(C)	TR. SI, NPN			
Q630	2SC3315(C)	TR. SI, NPN			
Q631	2SC3315(C)	TR. SI, NPN			
Q632	2SC3779(D)	TR. SI, NPN			
Q633	2SC3779(D)	TR. SI, NPN			
R1	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R2	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R3	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R4	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R5	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R6	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R7	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R8	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R9	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R10	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R11	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R12	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R13	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R14	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R101	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R102	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R103	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R104	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R105	NO USE				
R106	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R107	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R108	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R109	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R110	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R111	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R112	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R117	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R118	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R119	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R120	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R121	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R122	RD14BB2C750J	RES. CARBON	75	5%	1/6W
R123	RD14BB2C301J	RES. CARBON	300	5%	1/6W

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R124	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R125	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R126	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R127	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R128	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R129	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R130	NO USE				
R131	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R132	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R133	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R134	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R135	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R136	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R137	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R138	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R139	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R140	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R141	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R142	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R143	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R144	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R145	RN14BK2C1500D	RES. METAL FILM	150	0.5%	1/6W
R146	RN14BK2C1500D	RES. METAL FILM	150	0.5%	1/6W
R147	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R148	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R149	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R150	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R151	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R152	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R153	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R154	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R155	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R156	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R157	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R158	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R159	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R160	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R161	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R162	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R163	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R164	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R167	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R168	NO USE				
R169	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R170	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R171	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R172	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R173	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R174	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R175	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R176	RN14BK2C1301F	RES. METAL FILM	1.3K	1%	1/6W
R177	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R178	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R179	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R180	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R181	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R182	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R183	RD14BB2C100J	RES. CARBON	10	5%	1/6W

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R184	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R185	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R186	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R187	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R190	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R201	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R202	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R203	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R204	NO USE				
R205	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R206	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R207	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R208	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R209	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R210	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R211	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R212	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R217	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R218	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R219	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R220	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R221	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R222	RD14BB2C750J	RES. CARBON	75	5%	1/6W
R223	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R224	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R225	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R226	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R227	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R228	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R229	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R230	NO USE				
R231	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R232	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R233	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R234	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R235	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R236	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R237	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R238	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R239	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R240	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R241	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R242	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R243	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R244	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R245	RN14BK2C1500D	RES. METAL FILM	150	0.5%	1/6W
R246	RN14BK2C1500D	RES. METAL FILM	150	0.5%	1/6W
R247	RN14BK2C3000D	RES. METAL FILM	300	0.5%	1/6W
R248	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R249	NO USE				
R250	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R251	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R252	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R253	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R254	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R255	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R256	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R257	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R258	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R259	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R260	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R261	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R262	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R263	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R264	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R267	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R268	NO USE				
R269	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R270	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R271	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R272	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R273	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R274	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R275	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R276	RN14BK2C1301F	RES. METAL FILM	1.3K	1%	1/6W
R277	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R278	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R279	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R280	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R281	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R282	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R283	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R284	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R285	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R286	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R287	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R290	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R301	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R302	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R303	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R304	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R305	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R306	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R307	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R308	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R309	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R310	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R311	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R312	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R313	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R314	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R315	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R401	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R402	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R403	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R404	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R405	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R406	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R407	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R408	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R409	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W

* * * PARTS LIST * * *

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R410	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R411	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R412	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R413	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R414	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R415	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R501	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R502	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R503	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R504	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R505	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R506	RD14BB2C433J	RES. CARBON	43K	5%	1/6W
R507	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R508	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R509	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R510	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R511	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R512	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R513	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R514	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R515	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R516	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R517	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R518	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R519	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R520	RD14BB2C433J	RES. CARBON	43K	5%	1/6W
R521	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R522	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R523	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R524	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R525	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R526	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R527	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R528	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R529	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R530	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R531	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R532	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R533	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R534	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R535	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R536	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R537	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R538	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R539	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R540	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R541	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R542	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R543	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R544	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R545	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R546	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R547	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R548	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R549	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R550	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R551	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R552	RD14BB2C102J	RES. CARBON	1K	5%	1/6W

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R553	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R554	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R555	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R556	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R557	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R558	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R559	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R560	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R561	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R562	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R563	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R564	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R565	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R566	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R567	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R568	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R569	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R570	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R571	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W
R572	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R573	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R574	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R575	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R576	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R577	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R578	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R579	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R580	RD14BB2C113J	RES. CARBON	11K	5%	1/6W
R581	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R582	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
R583	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R584	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R585	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R586	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R587	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R588	RN14BK2C91R0F	RES. METAL FILM	91.0	1%	1/6W
R589	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R590	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R591	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R592	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R593	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R594	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R595	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R596	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R597	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R598	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R599	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R600	NO USE				
R601	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R602	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R603	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R604	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R605	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R606	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R607	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R608	NO USE				
R609	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R610	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R611	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W

* * * PARTS LIST * * *

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R612	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R613	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R614	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R615	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R616	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R617	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R618	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R619	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R620	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R621	NO USE				
R622	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R623	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R624	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R625	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R626	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R627	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R628	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R629	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R630	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R631	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R632	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R633	RN14BK2C1300F	RES. METAL FILM	130	1%	1/6W
R634	NO USE				
R635	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R636	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R637	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R638	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R639	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R640	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R641	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R642	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R643	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R644	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R645	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R646	RN14BK2C1300F	RES. METAL FILM	130	1%	1/6W
R647	NO USE				
R648	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R649	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R650	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R651	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R652	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R653	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R654	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R655	R90-0657-05	RES. MULTIPLE	8X330	1%	
R656	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R657	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R658	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R659	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R660	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R661	RN14BK2C2701F	RES. METAL FILM	2.7K	1%	1/6W
R662	RN14BK2C2701F	RES. METAL FILM	2.7K	1%	1/6W
R663	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R664	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R665	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R666	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R667	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R668	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R669	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R670	RD14BB2C220J	RES. CARBON	22	5%	1/6W

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R671	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R672	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R673	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R674	RN14BK2C2701F	RES. METAL FILM	2.7K	1%	1/6W
R675	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R676	E31-2170-05	JUMPING WIRE			
R677	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R678	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R679	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R680	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R681	RN14BK2C8200F	RES. METAL FILM	820	1%	1/6W
R682	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R683	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R684	RD14BB2C300J	RES. CARBON	30	5%	1/6W
R685	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R686	RD14BB2C111J	RES. CARBON	110	5%	1/6W
R687	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R688	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R689	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R690	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R691	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R701	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R702	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R703	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R704	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R705	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R706	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R707	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R708	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R709	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R710	RN14BK2C1601F	RES. METAL FILM	1.6K	1%	1/6W
R711	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R712	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R713	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R714	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R801	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R802	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R803	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R811	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R812	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R821	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R822	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R901	RD14BB2C560J	RES. CARBON	56	5%	1/6W
R902	RD14BB2C560J	RES. CARBON	56	5%	1/6W
TC101	C05-0469-05	CAP. TRIMMER	10P		
TC201	C05-0469-05	CAP. TRIMMER	10P		
TC501	C05-0469-05	CAP. TRIMMER	10P		
TC502	C05-0469-05	CAP. TRIMMER	10P		
TC503	C05-0469-05	CAP. TRIMMER	10P		
TC504	C05-0469-05	CAP. TRIMMER	10P		

* * * PARTS LIST * * *

X73-1760-01

REF.NO	PARTS NO	NAME & DESCRIPTION
TH501	SDT100	THERMISTOR
U1	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U2	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U3	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U4	HD74LS42P	IC,BCD TO DECIMAL DECODER
U5	SN74ALS00AN	IC,QUAD 2 INPUT NAND GATE
U6	SN74ALS112AN	IC, DUAL J-K F.F.(WITH PR&CLR)
U7	SN74ALS00AN	IC,QUAD 2 INPUT NAND GATE
U8	SN74ALS112AN	IC, DUAL J-K F.F.(WITH PR&CLR)
U9	SN74ALS00AN	IC,QUAD 2 INPUT NAND GATE
U101	NJM4558D	IC,DUAL OP AMP
U102	KMC03	IC, LINEAR
U201	NJM4558D	IC,DUAL OP AMP
U202	KMC03	IC, LINEAR
VR101	R12-0569-05	RES. SEMI FIXED 100B
VR102	R12-0569-05	RES. SEMI FIXED 100B
VR103	R12-2520-05	RES. SEMI FIXED 5KB
VR104	R12-3543-05	RES. SEMI FIXED 20KB
VR201	R12-0569-05	RES. SEMI FIXED 100B
VR202	R12-0569-05	RES. SEMI FIXED 100B
VR203	R12-2520-05	RES. SEMI FIXED 5KB
VR204	R12-3543-05	RES. SEMI FIXED 20KB
VR501	R12-0570-05	RES. SEMI FIXED 200B
VR502	R12-1538-05	RES. SEMI FIXED 1KB
VR503	R12-3543-05	RES. SEMI FIXED 20KB
VR504	R12-0570-05	RES. SEMI FIXED 200B
VR505	R12-1538-05	RES. SEMI FIXED 1KB
VR506	R12-3543-05	RES. SEMI FIXED 20KB
VR507	R12-0570-05	RES. SEMI FIXED 200B
VR508	R12-1538-05	RES. SEMI FIXED 1KB
VR509	R12-3543-05	RES. SEMI FIXED 20KB
VR510	R12-0570-05	RES. SEMI FIXED 200B
VR511	R12-1538-05	RES. SEMI FIXED 1KB
VR512	R12-3543-05	RES. SEMI FIXED 20KB
VR513	R12-3543-05	RES. SEMI FIXED 20KB
VR601	R12-3543-05	RES. SEMI FIXED 20KB
VR602	R12-3543-05	RES. SEMI FIXED 20KB
VR603	R12-3543-05	RES. SEMI FIXED 20KB
VR604	R12-3543-05	RES. SEMI FIXED 20KB

* * * PARTS LIST * * *

X74-1480-02 (HORIZONTAL UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E31-5572-05	WIRE ASS'Y(NO.1)			
	J61-0408-05	WIRE WRAPPING BAND			
	J73-0008-02	PCB (UNMOUNTED)			
C1	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C2	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C3	CC45CH1H030C	CAP. CERAMIC	3P	0.25P	50V
C4	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C5	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C6	CC45CH1H221J	CAP. CERAMIC	220P	5%	50V
C7	CC45FCH1H200J	CAP. CERAMIC	20P	5%	50V
C8	CF92V1H333J	CAP. PLASTIC FILM	0.033	5%	50V
C9	CF92V1H684J	CAP. PLASTIC FILM	0.68	5%	50V
C10	CF92V1H684J	CAP. PLASTIC FILM	0.68	5%	50V
C11	CE04EW1A470M	CAP. ELECTRO	47	20%	10V
C12	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C13	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C14	CC45CH1H030C	CAP. CERAMIC	3P	0.25P	50V
C15	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C16	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C17	CC45FCH1H200J	CAP. CERAMIC	20P	5%	50V
C18	CF92V1H333J	CAP. PLASTIC FILM	0.033	5%	50V
C19	CC45CH1H221J	CAP. CERAMIC	220P	5%	50V
C20	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C21	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C22	NO USE				
C23	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C24	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C25	NO USE				
C26	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C27	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C101	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C102	CK45FB1H222K	CAP. CERAMIC	2200P	10%	50V
C103	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C104	CC45FCH1H050C	CAP. CERAMIC	5P	0.25P	50V
C105	CK45FB1H222K	CAP. CERAMIC	2200P	10%	50V
C106	CK45FB1H222K	CAP. CERAMIC	2200P	10%	50V
C107	CE04EW1A470M	CAP. ELECTRO	47	20%	10V
C108	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C109	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C110	CM93BD2A101J	CAP. MICA	100P	5%	100V
C111	C91-1272-05	CAP. PLASTIC FILM	1.5	5%	100V
C112	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C113	CE04EW1A470M	CAP. ELECTRO	47	20%	10V
C114	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C115	CC45FSL1H391J	CAP. CERAMIC	390P	5%	50V
C116	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C117	CF92V1H224J	CAP. POLYESTER	0.22	5%	50V
C118	CC45CH1H330J	CAP. CERAMIC	33P	5%	50V
C119	NO USE				
C120	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C121	CC45FCH1H680J	CAP. CERAMIC	68P	5%	50V
C122	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C123	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C124	CM93BD2A101J	CAP. MICA	100P	5%	100V
C125	C91-1272-05	CAP. PLASTIC FILM	1.5	5%	100V
C126	NO USE				
C127	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C128	CE04EW1A470M	CAP. ELECTRO	47	20%	10V

* * * PARTS LIST * * *

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REF.NO	PARTS NO	NAME & DESCRIPTION				
C129	CC45FCH1H470J	CAP.	CERAMIC	47P	5%	50V
C130	CK45FB1H102K	CAP.	CERAMIC	1000P	10%	50V
C131	CK45FB1H102K	CAP.	CERAMIC	1000P	10%	50V
C132	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C133	CC45FCH1H101J	CAP.	CERAMIC	100P	5%	50V
C134	CE04EW1C330M	CAP.	ELECTRO	33	20%	16V
C135	CE04EW1C330M	CAP.	ELECTRO	33	20%	16V
C136	CE04HW1H010M	CAP.	ELECTRO	1	20%	50V
C137	CE04EW1C220M	CAP.	ELECTRO	22	20%	16V
C138	CC45FCH1H470J	CAP.	CERAMIC	47P	5%	50V
C139	CQ92FM1H104K	CAP.	MYLAR	0.1	10%	50V
C140	CQ92FM1H104K	CAP.	MYLAR	0.1	10%	50V
C141	CC45FCH1H200J	CAP.	CERAMIC	20P	5%	50V
C145	CK45FB1H102K	CAP.	CERAMIC	1000P	10%	50V
C302	CE04EW1A470M	CAP.	ELECTRO	47	20%	10V
C303	NO USE					
C304	CC45FCH1H470J	CAP.	CERAMIC	47P	5%	50V
C305	CC45FCH1H101J	CAP.	CERAMIC	100P	5%	50V
C306	C90-0987-05	CAP.	ELECTRO	1000	20%	6.3V
C310	CC45FCH1H070D	CAP.	CERAMIC	7P	0.5P	50V
C311	CC45FCH1H470J	CAP.	CERAMIC	47P	5%	50V
C312	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C313	CC45FCH1H070D	CAP.	CERAMIC	7P	0.5P	50V
C325	CE04EW1H2R2M	CAP.	ELECTRO	2.2	20%	50V
C401	CC45FCH1H680J	CAP.	CERAMIC	68P	5%	50V
C402	CC45FCH1H910J	CAP.	CERAMIC	91P	5%	50V
C403	CC45FCH1H910J	CAP.	CERAMIC	91P	5%	50V
C404	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C405	CC45FCH1H101J	CAP.	CERAMIC	100P	5%	50V
C406	CE04EW1C100M	CAP.	ELECTRO	10	20%	16V
C407	CC45FCH1H470J	CAP.	CERAMIC	47P	5%	50V
C501	CQ92FM1H104K	CAP.	MYLAR	0.1	10%	50V
C502	CQ92FM1H104K	CAP.	MYLAR	0.1	10%	50V
C503	CQ92FM1H104K	CAP.	MYLAR	0.1	10%	50V
C504	CQ92FM1H104K	CAP.	MYLAR	0.1	10%	50V
C505	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C506	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C507	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C508	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C509	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C510	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C511	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C512	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C513	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C514	NO USE					
C515	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C516	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C517	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C518	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C519	CE04EW1A101M	CAP.	ELECTRO	100	20%	10V
C528	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V
C529	CK45FF1H103Z	CAP.	CERAMIC	0.01		50V

*** PARTS LIST ***

X74-1480-02

REF.NO	PARTS NO	NAME & DESCRIPTION			
C530	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C531	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C532	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C533	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C534	CE04EW1A101M	CAP. ELECTRO	100	20%	10V
C535	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C551	CE04EW1A471M	CAP. ELECTRO	470	20%	10V
C552	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C553	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C554	CE04EW1A102M	CAP. ELECTRO	1000	20%	10V
C555	CE04EW1C101M	CAP. ELECTRO	100	20%	16V
C556	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C557	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C558	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C802	CE04BW1H010M	CAP. ELECTRO	1	20%	50V
C805	CC45CH1H270J	CAP. CERAMIC	27P	5%	50V
C806	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C807	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C808	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C809	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C810	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C901	CC45CH1H470J	CAP. CERAMIC	47P	5%	50V
D2	1SS132	DIODE			
D3	MA700	DIODE			
D4	MA700	DIODE			
D5	MA700	DIODE			
D6	MA700	DIODE			
D7	MA700	DIODE			
D8	NO USE				
D9	1SS132	DIODE			
D10	MA700	DIODE			
D101	MA700	DIODE			
D102	MA700	DIODE			
D103	MA700	DIODE			
D104	MA700	DIODE			
D105	MA700	DIODE			
D106	MA700	DIODE			
D107	MA700	DIODE			
D108	MA700	DIODE			
D109	MA700	DIODE			
D110	MA700	DIODE			
D111	MA700	DIODE			
D112	1SS132	DIODE			
D113	1SS132	DIODE			
D114	NO USE				
D115	MA700	DIODE			
D116	MA700	DIODE			
D117	MA700	DIODE			
D118	1SS132	DIODE			
D119	1SS132	DIODE			
D120	1SS132	DIODE			
D121	NO USE				
D122	MA700	DIODE			

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION	
D123	MA700	DIODE	
D124	1S1587	DIODE	
D125	NO USE		
D126	1S1587	DIODE	
D127	NO USE		
D128	1SS132	DIODE	
D301	1SS132	DIODE	
D302	1SS132	DIODE	
D303	1SS132	DIODE	
D304	MA700	DIODE	
D305	1SS132	DIODE	
D306	MA700	DIODE	
D307	1SS132	DIODE	
D308	1SS132	DIODE	
D309	1SS132	DIODE	
D310	MA700	DIODE	
D311	MA700	DIODE	
D312	MA700	DIODE	
D313	MA700	DIODE	
D314	MA700	DIODE	
D315	1SS132	DIODE	
D316	1SS132	DIODE	
D401	1SS132	DIODE	
D402	MA700	DIODE	
D801	1SS132	DIODE	
D802	1SS132	DIODE	
D803	1SS132	DIODE	
D804	MTZ3.3JA	DIODE, ZENER	3.27V
D805	1SS132	DIODE	
D806	1SS132	DIODE	
D807	1SS132	DIODE	
D808	1SS132	DIODE	
D809	1SS132	DIODE	
K1	S51-1527-05	RELAY	
K2	S51-1527-05	RELAY	
L1	L40-1011-04	FERRI INDUCTOR	100UH
L2	L40-2201-03	FERRI INDUCTOR	22UH
L3	L40-2201-03	FERRI INDUCTOR	22UH
P18	E40-7035-05	SOCKET	40P
P101	E40-0711-05	PIN CONNECTOR	7P
Q1	2SC3779(D)	TR. SI, NPN	
Q2	2SC3779(D)	TR. SI, NPN	
Q3	2SA1565	TR. SI, PNP	
Q4	2SK304(F)	FET, N-CHANNEL	
Q5	2SA1206	TR. SI, PNP	
Q6	2SC3779(D)	TR. SI, NPN	
Q7	2SA1206	TR. SI, PNP	
Q8	2SC2785(F)	TR. SI, NPN	
Q9	2SA1565	TR. SI, PNP	
Q10	2SK304(F)	FET, N-CHANNEL	

*** PARTS LIST ***

X74-1480-02

REF.NO	PARTS NO	NAME & DESCRIPTION
Q14	2SC3779(D)	TR. SI, NPN
Q15	2SC3779(D)	TR. SI, NPN
Q16	2SA1565	TR. SI, PNP
Q17	2SA1206	TR. SI, PNP
Q18	2SC3779(D)	TR. SI, NPN
Q19	2SA1206	TR. SI, PNP
Q20	2SC2785(F)	TR. SI, NPN
Q101	2SC4049	TR. SI, NPN
Q102	NO USE	
Q103	2SA1206	TR. SI, PNP
Q104	2SC2785(F)	TR. SI, NPN
Q105	2SC4049	TR. SI, NPN
Q106	2SC4049	TR. SI, NPN
Q107	2SC4049	TR. SI, NPN
Q108	NO USE	
Q109	2SA1005(K)	TR. SI, PNP
Q110	2SA1174(E,F)	TR. SI, PNP
Q111	2SC3732(L)	TR. SI, NPN
Q112	2SC3732(L)	TR. SI, NPN
Q113	2SA1175(F)	TR. SI, PNP
Q114	2SC3315(C)	TR. SI, NPN
Q115	2SA1175(F)	TR. SI, PNP
Q116	2SC3354(T,S)	TR. SI, NPN
Q117	2SC3315(C)	TR. SI, NPN
Q118	2SC2785(F)	TR. SI, NPN
Q119	2SA1175(F)	TR. SI, PNP
Q120	2SC2785(F)	TR. SI, NPN
Q121	2SC3732(L)	TR. SI, NPN
Q122	2SA1206	TR. SI, PNP
Q123	2SC3315(C)	TR. SI, NPN
Q124	2SA1206	TR. SI, PNP
Q125	2SA1565	TR. SI, PNP
Q126	2SA1206	TR. SI, PNP
Q127	2SA1206	TR. SI, PNP
Q128	2SA1005(K)	TR. SI, PNP
Q129	2SA1174(E,F)	TR. SI, PNP
Q130	2SC3732(L)	TR. SI, NPN
Q131	2SC3732(L)	TR. SI, NPN
Q132	2SA1175(F)	TR. SI, PNP
Q133	2SC3315(C)	TR. SI, NPN
Q134	2SC3354(T,S)	TR. SI, NPN
Q135	2SC3315(C)	TR. SI, NPN
Q136	2SC3732(L)	TR. SI, NPN
Q137	2SC3732(L)	TR. SI, NPN
Q301	2SA1175(F)	TR. SI, PNP
Q302	2SC2785(F)	TR. SI, NPN
Q303	2SC3315(C)	TR. SI, NPN
Q304	2SC3315(C)	TR. SI, NPN
Q305	2SC3315(C)	TR. SI, NPN
Q306	2SC3315(C)	TR. SI, NPN
Q307	2SC3315(C)	TR. SI, NPN
Q308	2SC3315(C)	TR. SI, NPN
Q309	2SC3315(C)	TR. SI, NPN
Q310	2SA1565	TR. SI, PNP
Q311	2SC3354(T,S)	TR. SI, NPN
Q314	2SC3354(T,S)	TR. SI, NPN

*** PARTS LIST ***

X74-1480-02

REF.NO	PARTS NO	NAME & DESCRIPTION			
Q401	2SK583	FET, N-CHANNEL			
Q402	2SA1175(F)	TR. SI, PNP			
Q403	2SA1005(K)	TR. SI, PNP			
Q404	2SA1005(K)	TR. SI, PNP			
Q405	2SA1175(F)	TR. SI, PNP			
Q406	2SC2785(F)	TR. SI, NPN			
Q801	2SC2785(F)	TR. SI, NPN			
R1	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R2	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
R3	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R4	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W
R5	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R6	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R7	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R8	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R9	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R10	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R11	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R12	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R13	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R14	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R15	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R16	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R17	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R18	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R19	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R20	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R21	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R22	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R23	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R24	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R25	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R26	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R27	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R28	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R29	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R33	RD14BB2C754J	RES. CARBON	750K	5%	1/6W
R34	RD14BB2C754J	RES. CARBON	750K	5%	1/6W
R35	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R36	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R37	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R38	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R39	RN14BK2C5100F	RES. METAL FILM	510	1%	1/6W
R40	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R41	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R42	RN14BK2C5100F	RES. METAL FILM	510	1%	1/6W
R43	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R44	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R45	NO USE				
R46	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R51	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R52	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R53	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R54	RN14BK2C1600F	RES. METAL FILM	160	1%	1/6W

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R55	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R56	NO USE				
R57	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R58	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R59	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R60	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R61	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R62	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R63	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R64	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R65	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R66	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R67	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R68	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R69	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R70	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R71	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R72	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R73	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R74	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R77	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R78	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R79	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R80	RD14BB2C361J	RES. CARBON	360	5%	1/6W
R81	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R82	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R83	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R101	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R102	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R103	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R104	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R105	R90-0659-05	RES. NETWORK	4X510	5%	1/8W
R106	NO USE				
R107	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R108	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R109	R90-0660-05	RES. NETWORK	4X1K	5%	1/8W
R110	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R111	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R112	RD14BB2C751J	RES. CARBON	750	5%	1/6W
R113	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R114	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R115	R90-0659-05	RES. NETWORK	4X510	5%	1/8W
R116	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R117	R90-0660-05	RES. NETWORK	4X1K	5%	1/8W
R118	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R119	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R120	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R121	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R122	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R123	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R124	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R125	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R126	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R127	R90-0658-05	RES. NETWORK			
R128	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R129	NO USE				
R130	RD14BB2C473J	RES. CARBON	47K	5%	1/6W

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R131	NO USE				
R132	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R133	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R134	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R135	RD14BB2C241J	RES. CARBON	240	5%	1/6W
R136	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R137	RD14BB2C362J	RES. CARBON	3.6K	5%	1/6W
R138	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R139	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R140	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R141	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R142	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R143	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R144	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R145	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R146	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R147	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R148	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R149	RN14BK2C6801F	RES. METAL FILM	6.8K	1%	1/6W
R150	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R151	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R152	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R153	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R154	RN14BK2C1152F	RES. METAL FILM	11.5K	1%	1/6W
R155	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R156	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R157	RD14BB2C563J	RES. CARBON	56K	5%	1/6W
R158	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R159	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R160	RN14BK2C5601F	RES. METAL FILM	5.6K	1%	1/6W
R161	RN14BK2C9101F	RES. METAL FILM	9.1K	1%	1/6W
R162	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R163	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R164	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R165	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R166	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R167	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R168	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R169	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R170	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R171	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R172	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R173	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R174	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R175	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R176	RD14BB2C224J	RES. CARBON	220K	5%	1/6W
R177	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R178	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R179	RD14BB2C752J	RES. CARBON	7.5K	5%	1/6W
R180	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R181	RN14BK2C1102F	RES. METAL FILM	11K	1%	1/6W
R182	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R183	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R184	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R185	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R186	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R187	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R188	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R189	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION
R190	RN14BK2C2701F	RES. METAL FILM 2.7K 1% 1/6W
R191	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R192	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R193	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R194	RD14BB2C331J	RES. CARBON 330 5% 1/6W
R195	R90-0658-05	RES. NETWORK
R196	RD14BB2C123J	RES. CARBON 12K 5% 1/6W
R197	RN14BK2C8201F	RES. METAL FILM 8.2K 1% 1/6W
R198	RN14BK2C1601F	RES. METAL FILM 1.6K 1% 1/6W
R199	RD14BB2C242J	RES. CARBON 2.4K 5% 1/6W
R200	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R201	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R202	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R203	RD14BB2C241J	RES. CARBON 240 5% 1/6W
R204	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W
R205	RD14BB2C362J	RES. CARBON 3.6K 5% 1/6W
R206	RD14BB2C561J	RES. CARBON 560 5% 1/6W
R207	RD14BB2C471J	RES. CARBON 470 5% 1/6W
R208	RD14BB2C162J	RES. CARBON 1.6K 5% 1/6W
R209	RD14BB2C182J	RES. CARBON 1.8K 5% 1/6W
R210	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R211	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R212	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R213	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R214	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R215	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R216	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R217	RN14BK2C4301F	RES. METAL FILM 4.3K 1% 1/6W
R218	RN14BK2C1302F	RES. METAL FILM 13K 1% 1/6W
R219	RD14BB2C182J	RES. CARBON 1.8K 5% 1/6W
R220	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R221	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R222	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R223	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R224	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W
R225	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W
R226	RD14BB2C123J	RES. CARBON 12K 5% 1/6W
R227	RD14BB2C223J	RES. CARBON 22K 5% 1/6W
R228	NO USE	
R229	RD14BB2C105J	RES. CARBON 1M 5% 1/6W
R301	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W
R302	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R305	RD14BB2C562J	RES. CARBON 5.6K 5% 1/6W
R306	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R307	RD14BB2C562J	RES. CARBON 5.6K 5% 1/6W
R308	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R309	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W
R310	NO USE	
R311	RN14BK2C3001F	RES. METAL FILM 3K 1% 1/6W
R312	RN14BK2C3601F	RES. METAL FILM 3.6K 1% 1/6W
R313	RN14BK2C3601F	RES. METAL FILM 3.6K 1% 1/6W
R314	RD14BB2C203J	RES. CARBON 20K 5% 1/6W
R315	RD14BB2C273J	RES. CARBON 27K 5% 1/6W
R316	RD14BB2C273J	RES. CARBON 27K 5% 1/6W
R317	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R318	RN14BK2C2001F	RES. METAL FILM 2K 1% 1/6W
R319	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W

* * * PARTS LIST * * *

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R320	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R321	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R322	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R323	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R324	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R325	RD14BB2C164J	RES. CARBON	160K	5%	1/6W
R326	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R327	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R328	RD14BB2C131J	RES. CARBON	130	5%	1/6W
R329	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R330	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R331	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R332	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R333	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R334	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R335	RN14BK2C5602F	RES. METAL FILM	56K	1%	1/6W
R336	RN14BK2C1502F	RES. METAL FILM	15K	1%	1/6W
R337	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R338	NO USE				
R339	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R340	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R341	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R342	R90-0660-05	RES. NETWORK	4X1K	5%	1/8W
R343	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R344	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R345	RN14BK2C5601F	RES. METAL FILM	5.6K	1%	1/6W
R346	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R347	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R348	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R349	RN14BK2C2001F	RES. METAL FILM	2K	1%	1/6W
R350	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R351	RN14BK2C2702F	RES. METAL FILM	27K	1%	1/6W
R352	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R353	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R354	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R355	RN14BK2C3301F	RES. METAL FILM	3.3K	1%	1/6W
R356	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R357	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R358	RD14BB2C202J	RES. CARBON	2K	5%	1/6W
R359	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R360	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R361	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R362	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R363	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R364	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R365	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R366	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R367	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R368	RN14BK2C1602F	RES. METAL FILM	16K	1%	1/6W
R369	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R370	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R371	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R372	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R373	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R374	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R401	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R402	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R403	NO USE				

* * * PARTS LIST * * *

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R404	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R405	RD14BB2C752J	RES. CARBON	7.5K	5%	1/6W
R406	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R407	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R408	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R409	RD14BB2C273J	RES. CARBON	27K	5%	1/6W
R410	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R411	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R412	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R413	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R414	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R415	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R416	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R417	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R418	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R419	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R420	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R421	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R422	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R423	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R801	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R802	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R803	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R806	RD14BB2C393J	RES. CARBON	39K	5%	1/6W
R807	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R808	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R809	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R810	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R811	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R812	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R813	RD14BB2C511J	RES. CARBON	510	5%	1/6W
R814	NO USE				
R815	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R816	RN14BK2C75R0F	RES. METAL FILM	75.0	1%	1/6W
R901	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
TC101	C05-0446-05	CAP. TRIMMER	30P		
TC102	C05-0446-05	CAP. TRIMMER	30P		
TC302	C05-0468-05	CAP. TRIMMER	7P		
TC303	C05-0468-05	CAP. TRIMMER	7P		
U1	MC10H102L	IC, QUAD 2-INPUT NOR GATE			
U2	MC10H102L	IC, QUAD 2-INPUT NOR GATE			
U3	MC10H131L	IC, DUAL D-FLIP FLOP			
U4	MC10103L	IC, QUAD 2-INPUT OR GATE			
U5	SN74ALS74AN	IC, DUAL D-F.F.(WITH PR &CLR)			
U6	SN74ALS74AN	IC, DUAL D-F.F.(WITH PR &CLR)			
U7	SN74ALS74AN	IC, DUAL D-F.F.(WITH PR &CLR)			
U8	SN74ALS191N	IC,SYNC. U/D 4-BIT BINARY COUN			
U9	SN74ALS191N	IC,SYNC. U/D 4-BIT BINARY COUN			
U10	SN74ALS191N	IC,SYNC. U/D 4-BIT BINARY COUN			
U11	SN74ALS02N	IC,QUAD 2 INPUT NOR			
U12	SN74ALS32N	IC,QUAD 2 INPUT OR			
U13	SN74ALS08N	IC,QUAD 2 INPUT AND			
U14	SN74ALS32N	IC,QUAD 2 INPUT OR			

*** PARTS LIST ***

X74-1480-02

REF.NO	PARTS NO	NAME & DESCRIPTION
U15	SN74ALS02N	IC,QUAD 2 INPUT NOR
U16	MC14052BCP	IC,DUAL 4-CH ANALOG MPX/DE-MPX
U17	MC14052BCP	IC,DUAL 4-CH ANALOG MPX/DE-MPX
U18	MC14052BCP	IC,DUAL 4-CH ANALOG MPX/DE-MPX
U19	MC74HC4053AN	IC,TRIPLE 2CH ANALOG MPX/DE-MP
U20	NO USE	
U21	NJM072S	IC,J-FET INPUT OP AMP
U22	NJM072S	IC,J-FET INPUT OP AMP
U23	NO USE	
U24	NJM072S	IC,J-FET INPUT OP AMP
U25	NJM072S	IC,J-FET INPUT OP AMP
U26	NJM072S	IC,J-FET INPUT OP AMP
U27	NJM072S	IC,J-FET INPUT OP AMP
U28	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U29	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U30	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U31	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U32	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U101	2SK332(E)	FET, N-CHANNEL
U102	2SC3066(F)	TR. SI, NPN
U103	2SK332(E)	FET, N-CHANNEL
VR1	R12-3543-05	RES. SEMI FIXED 20KB
VR2	NO USE	
VR3	R12-0571-05	RES. SEMI FIXED 500B
VR4	R12-3543-05	RES. SEMI FIXED 20KB
VR101	R12-1538-05	RES. SEMI FIXED 1KB
VR102	R12-2520-05	RES. SEMI FIXED 5KB
VR103	NO USE	
VR104	R12-3543-05	RES. SEMI FIXED 20KB
VR301	R12-1539-05	RES. SEMI FIXED 2KB
VR302	R12-1539-05	RES. SEMI FIXED 2KB
VR303	R12-0571-05	RES. SEMI FIXED 500B
VR304	R12-3453-05	RES. SEMI FIXED 10KB
VR305	R12-3453-05	RES. SEMI FIXED 10KB
VR306	R12-3453-05	RES. SEMI FIXED 10KB
VR307	R12-0569-05	RES. SEMI FIXED 100B

* * * PARTS LIST * * *

X75-1180-01 (ATT UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E04-0260-05	BNC RECEPTACLE (READOUT)			
	J21-4612-14	BRACKET,FOR BNC			
	J25-5230-13	PCB (UNMOUNTED)			
	J30-0623-04	SPACER			
	N35-3006-41	SCREW	M 3X6		
C1	CE04EW1C471M	CAP. ELECTRO	470	20%	16V
C2	CE04EW1C471M	CAP. ELECTRO	470	20%	16V
C3	CE04EW1A221M	CAP. ELECTRO	220	20%	10V
C4	CE04EW1A221M	CAP. ELECTRO	220	20%	10V
C5	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C6	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C7	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C8	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C9	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C10	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C11	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C12	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C13	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C14	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C15	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C16	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C17	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C18	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C19	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C20	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C101	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C102	NO USE				
C103	CE04EW1C330M	CAP. ELECTRO	33	20%	16V
C104	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C105	NO USE				
C106	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C107	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C201	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C202	NO USE				
C203	CE04EW1C330M	CAP. ELECTRO	33	20%	16V
C204	CC45CH1H101J	CAP. CERAMIC	100P	5%	50V
C205	NO USE				
C206	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C207	CC45FCH1H470J	CAP. CERAMIC	47P	5%	50V
C301	CC45CH2H050C	CAP. CERAMIC	5P	0.25P	500V
C302	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C303	NO USE				
C304	CC45FCH1H030C	CAP. CERAMIC	3P	0.25P	50V
C305	CC45CH2H080D	CAP. CERAMIC	8P	0.5P	500V
C306	NO USE				
C307	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C350	CC45CH1H180J	CAP. CERAMIC	18P	5%	50V
C351	CC45CH1H220J	CAP. CERAMIC	22P	5%	50V
C401	CC45CH2H050C	CAP. CERAMIC	5P	0.25P	500V
C402	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C403	NO USE				
C404	CC45FCH1H030C	CAP. CERAMIC	3P	0.25P	50V
C405	CC45CH2H080D	CAP. CERAMIC	8P	0.5P	500V
C406	NO USE				

* * * PARTS LIST * * *

X75-1180-01

REF.NO	PARTS NO	NAME & DESCRIPTION			
C407	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C450	CC45CH1H180J	CAP. CERAMIC	18P	5%	50V
C451	CC45CH1H220J	CAP. CERAMIC	22P	5%	50V
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D101	1SS132	DIODE			
D102	1SS132	DIODE			
D201	1SS132	DIODE			
D202	1SS132	DIODE			
D301	1SS132	DIODE			
D302	1SS132	DIODE			
D303	1SS135	DIODE			
D401	1SS132	DIODE			
D402	1SS132	DIODE			
D403	1SS135	DIODE			
J5	E38-0084-05	WIRE ASS'Y			
J6	E38-0085-05	WIRE ASS'Y			
K301	S51-2508-05	RELAY			
K401	S51-2508-05	RELAY			
L1	L40-1011-03	FERRI INDUCTOR	100UH		
P4	E40-5066-05	PIN CONNECTOR	9P		
P7	E40-3239-05	PIN CONNECTOR	4P		
P8	E40-3239-05	PIN CONNECTOR	4P		
P9	E40-3238-05	PIN CONNECTOR	3P		
Q1	2SA1565	TR. SI, PNP			
Q2	2SA1565	TR. SI, PNP			
Q101	2SC3354(T,S)	TR. SI, NPN			
Q102	2SC3354(T,S)	TR. SI, NPN			
Q201	2SC3354(T,S)	TR. SI, NPN			
Q202	2SC3354(T,S)	TR. SI, NPN			
Q301	2SK241(GR)	FET, N-CHANNEL			
Q302	2SK241(GR)	FET, N-CHANNEL			
Q303	2SC3354(T,S)	TR. SI, NPN			
Q304	2SC3779(D)	TR. SI, NPN			
Q305	2SC3779(D)	TR. SI, NPN			
Q306	2SC3354(T,S)	TR. SI, NPN			
Q401	2SK241(GR)	FET, N-CHANNEL			
Q402	2SK241(GR)	FET, N-CHANNEL			
Q403	2SC3354(T,S)	TR. SI, NPN			
Q404	2SC3779(D)	TR. SI, NPN			
Q405	2SC3779(D)	TR. SI, NPN			
Q406	2SC3354(T,S)	TR. SI, NPN			

*** PARTS LIST ***

X75-1180-01

REF.NO	PARTS NO	NAME & DESCRIPTION			
R1	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R2	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R3	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R4	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R5	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R6	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R7	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R8	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R9	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R101	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
R102	RD14BB2C824J	RES. CARBON	820K	5%	1/6W
R103	RN14BK2C62R0F	RES. METAL FILM	62.0	1%	1/6W
R104	RN14BK2C62R0F	RES. METAL FILM	62.0	1%	1/6W
R105	R92-1431-15	RES. TEMP. COEFF:	330	5%	1/6W
R106	RN14BK2C5100F	RES. METAL FILM	510	1%	1/6W
R107	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R108	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R109	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R110	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R111	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R112	NO USE				
R113	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R114	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R115	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R116	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R117	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
R118	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R119	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
R120	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R121	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R122	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R123	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R124	NO USE				
R125	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R126	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R127	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R128	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R150	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R201	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
R202	RD14BB2C824J	RES. CARBON	820K	5%	1/6W
R203	RN14BK2C62R0F	RES. METAL FILM	62.0	1%	1/6W
R204	RN14BK2C62R0F	RES. METAL FILM	62.0	1%	1/6W
R205	R92-1431-15	RES. TEMP. COEFF:	330	5%	1/6W
R206	RN14BK2C5100F	RES. METAL FILM	510	1%	1/6W
R207	RN14BK2C1003F	RES. METAL FILM	100K	1%	1/6W
R208	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R209	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R210	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R211	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R212	NO USE				
R213	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R214	RN14BK2C4301F	RES. METAL FILM	4.3K	1%	1/6W
R215	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R216	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R217	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W

*** PARTS LIST ***

X75-1180-01

REF.NO	PARTS NO	NAME & DESCRIPTION			
R218	RN14BK2C2401F	RES. METAL FILM	2.4K	1%	1/6W
R219	RN14BK2C7501F	RES. METAL FILM	7.5K	1%	1/6W
R220	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R221	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R222	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R223	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R224	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R225	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R226	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R227	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R228	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R250	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R301	RD14BB2E330J	RES. CARBON	33	5%	1/4W
R302	RD14BB2C560J	RES. CARBON	56	5%	1/6W
R303	R92-1433-05	RES. METAL FILM	800K	0.5%	1/2W
R304	R92-1432-05	RES. METAL FILM	250K	0.5%	1/2W
R305	RD14BB2C240J	RES. CARBON	24	5%	1/6W
R306	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
R307	RD14BB2C684J	RES. CARBON	680K	5%	1/6W
R308	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R309	RD14BB2C201J	RES. CARBON	200	5%	1/6W
R310	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R311	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R312	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R313	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R314	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R315	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R316	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R317	NO USE				
R318	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R319	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R320	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R350	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R401	RD14BB2E330J	RES. CARBON	33	5%	1/4W
R402	RD14BB2C560J	RES. CARBON	56	5%	1/6W
R403	R92-1433-05	RES. METAL FILM	800K	0.5%	1/2W
R404	R92-1432-05	RES. METAL FILM	250K	0.5%	1/2W
R405	RD14BB2C240J	RES. CARBON	24	5%	1/6W
R406	RN14BK2E1004D	RES. METAL FILM	1M	0.5%	1/4W
R407	RD14BB2C684J	RES. CARBON	680K	5%	1/6W
R408	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R409	RD14BB2C201J	RES. CARBON	200	5%	1/6W
R410	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R411	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R412	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R413	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R414	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R415	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R416	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R417	NO USE				
R418	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R419	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R420	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R450	RD14BB2C221J	RES. CARBON	220	5%	1/6W

*** PARTS LIST ***

X75-1180-01

REF.NO	PARTS NO	NAME & DESCRIPTION
S101	S02-4511-15	ATTENUATOR UNIT
S201	S02-4511-15	ATTENUATOR UNIT
TC101	C05-0459-05	CAP. TRIMMER 10P
TC201	C05-0459-05	CAP. TRIMMER 10P
TC301	C05-0031-15	CAP. TRIMMER 10P
TC302	C05-0031-15	CAP. TRIMMER 10P
TC401	C05-0031-15	CAP. TRIMMER 10P
TC402	C05-0031-15	CAP. TRIMMER 10P
U1	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U2	HD74HC595AP	IC, 8-BIT SHIFT REGISTER/LATCH
U101	DN1901	FET, DUAL, N-CHANNEL
U102	UPA101G	IC, NPN TRANSISTOR ARRAY
U201	DN1901	FET, DUAL, N-CHANNEL
U202	UPA101G	IC, NPN TRANSISTOR ARRAY
VR101	R12-3543-05	RES. SEMI FIXED 20KB
VR201	R12-3543-05	RES. SEMI FIXED 20KB

*** PARTS LIST ***

X76-1400-00 (LINE COUNTER UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J73-0015-13	PCB (UNMOUNTED)			
C1	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C2	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C3	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C4	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C5	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C6	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C7	CC45FCH1H100D	CAP. CERAMIC	10P	0.5P	50V
C8	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C9	CE04BW1E220M	CAP. ELECTRO	22	20%	25V
C10	CE04BW1E220M	CAP. ELECTRO	22	20%	25V
C11	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C12	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C13	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C14	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C15	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C16	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C17	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C18	CQ92FM1H682K	CAP. MYLAR	6800P	10%	50V
C19	CQ92FM1H154K	CAP. MYLAR	0.15	10%	50V
C20	CQ92FM1H103K	CAP. MYLAR	0.01	10%	50V
C21	CE04EW1H010M	CAP. ELECTRO	1	20%	50V
C22	CQ92FM1H102K	CAP. MYLAR	1000P	10%	50V
C23	CE04EW1H010M	CAP. ELECTRO	1	20%	50V
C24	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C25	CE04EW1H010M	CAP. ELECTRO	1	20%	50V
C26	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C27	NO USE				
C28	CC45FSL1H221J	CAP. CERAMIC	220P	5%	50V
C29	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C101	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C801	CC45SL1H221J	CAP. CERAMIC	220P	5%	50V
D1	MA700	DIODE			
D2	MTZ3.0JA				
D3	MTZ3.0JA				
D4	1SS132	DIODE			
D5	1SS132	DIODE			
D6	1SS132	DIODE			
D7	1SS132	DIODE			
D8	1SS132	DIODE			
D9	1SS132	DIODE			
D10	MA700	DIODE			
D11	1SS132	DIODE			
P34	E40-7121-05	PIN CONNECTOR	10P		
P35	E40-3242-05	PIN CONNECTOR	7P		
P36	E40-3238-05	PIN CONNECTOR	3P		
P37	E40-3237-05	PIN CONNECTOR	2P		
P38	E40-3238-05	PIN CONNECTOR	3P		
P101	E40-0718-05	PIN CONNECTOR	7P		
Q1	2SK241(GR)	FET, N-CHANNEL			
Q2	2SK304(F)				
Q3	2SC2785(F)	TR. SI, NPN			
Q4	2SA1175(F)	TR. SI, PNP			

*** PARTS LIST ***

X76-1400-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
Q5	2SC2785(F)	TR. SI, NPN			
R1	RD14BB2C752J	RES. CARBON	7.5K	5%	1/6W
R2	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R3	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R4	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R5	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R6	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R7	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R8	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R9	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R10	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R11	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R12	RD14BB2C105J	RES. CARBON	1M	5%	1/6W
R13	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R14	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R15	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R16	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R17	RD14BB2C684J	RES. CARBON	680K	5%	1/6W
R18	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R19	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R20	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R21	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R22	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R23	RD14BB2C274J	RES. CARBON	270K	5%	1/6W
R24	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R25	RD14BB2C334J	RES. CARBON	330K	5%	1/6W
R26	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R27	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R28	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
R29	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R30	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R31	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R32	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R33	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R101	RN14BK2C1202F	RES. METAL FILM	12K	1%	1/6W
R102	RN14BK2C1802F	RES. METAL FILM	18K	1%	1/6W
R103	RN14BK2C3002F	RES. METAL FILM	30K	1%	1/6W
R104	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R801	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R802	RD14BB2C101J	RES. CARBON	100	5%	1/6W
U1	NJM072M	IC,DUAL J-FET INPUT OP AMP			
U2	UA733CNS	IC,VIDEO AMP			
U3	LM1881M	IC,VIDEO SYNC SEPARATOR			
U4	HD74HC221FP	IC,DUAL MONO. MULTIVIB.			
U5	HD74HC123AFP	IC,DUAL RETRIGG. SINGLE SHOT			
U6	MC74HC58F	IC,2 INPUT/3 INPUT AND-OR GATE			
U7	HD74HC00FP	IC,QUAD 2 INPUT NAND GATE			
U8	HD74HC595FP	IC,8-BIT SHIFT REGISTER/LATCH			
U9	HD74HC123AFP	IC,DUAL RETRIGG. SINGLE SHOT			
U10	HD74HC10FP	IC,TRIPLE 3 INPUT NAND GATE			
U101	HD14052BFP	IC,DUAL 4-CH ANALOG MPX/DE-MPX			

*** PARTS LIST ***

X77-1490-01 (R/O UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E38-0206-05	LEAD WIRE WITH CONNECTOR			
	J73-0009-12	PCB (UNMOUNTED)			
B1	W09-0408-05	BATTERY.CR2354-1HF			
C1	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C2	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C3	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C4	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C5	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C6	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C7	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C8	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C9	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C10	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C11	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C12	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C13	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C14	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C15	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C16	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C17	CC45FCH1H220J	CAP. CERAMIC	22P	5%	50V
C18	CC45FCH1H220J	CAP. CERAMIC	22P	5%	50V
C19	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C20	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C21	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C22	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C23	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C24	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C25	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C26	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C27	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C28	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C29	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C30	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C31	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C32	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C33	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C34	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C35	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C36	CE04EW1C220M	CAP. ELECTRO	22	20%	16V
C37	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C38	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C39	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C40	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C41	CE04EW1E470M	CAP. ELECTRO	47	20%	25V
C42	CC45FSL1H471J	CAP. CERAMIC	470P	5%	50V
C43	CE04EW1A471M	CAP. ELECTRO	470	20%	10V
C44	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C45	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C48	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C49	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C50	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C51	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C52	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C53	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C54	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C55	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C56	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
C57	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C58	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C59	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C60	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C61	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C62	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C63	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C64	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C65	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C66	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C67	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C68	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C69	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C70	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C71	CC45FCH1H101J	CAP. CERAMIC	100P	5%	50V
C72	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C73	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C74	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C75	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C76	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C77	CE04EW1C471M	CAP. ELECTRO	470	20%	16V
C78	CE04EW1C471M	CAP. ELECTRO	470	20%	16V
C79	C91-1273-05	CAP. NETWORK	6X0.01U		50V
C80	CE04EW1A102M	CAP. ELECTRO	1000	20%	10V
C81	NO USE				
C82	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C86	C91-0769-05	CAP. AXIAL	0.01	20%	16V
C87	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C88	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C89	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C90	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C91	CC45FSL1H471J	CAP. CERAMIC	470P	5%	50V
C92	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C901	C91-0745-05	CAP. CERAMIC	100P	10%	50V
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D3	1SS132	DIODE			
D4	1SS132	DIODE			
D5	MTZ12JC	DIODE, ZENER	12.05V		
D6	1SS132	DIODE			
D7	1SS132	DIODE			
L1	L40-1011-03	FERRI INDUCTOR	100UH		
L2	L40-1021-03	FERRI INDUCTOR	1MH		
L3	L40-1092-03	FERRI INDUCTOR	1UH		
L4	L40-1011-03	FERRI INDUCTOR	100UH		
P1	E40-7036-05	PIN CONNECTOR	20P		
P2	E40-7037-05	PIN CONNECTOR	26P		
P3	E40-7035-05	SOCKET	40P		
P4	E40-5066-05	PIN CONNECTOR	9P		
Q1	2SA1175(F)	TR. SI, PNP			
Q2	2SC1384(R,S)	TR. SI, NPN			
R1	RD14BB2C102J	RES. CARBON	1K	5%	1/6W

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R2	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R3	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R4	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R5	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R6	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R7	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R8	NO USE				
R9	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R10	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R11	RD14BB2C243J	RES. CARBON	24K	5%	1/6W
R12	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R13	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R14	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R15	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R16	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R17	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R18	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R19	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R20	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R21	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R22	RN14BK2C1002F	RES. METAL FILM	10K	1%	1/6W
R23	RD14BB2C474J	RES. CARBON	470K	5%	1/6W
R24	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R25	RN14BK2C9100F	RES. METAL FILM	910	1%	1/6W
R26	RN14BK2C3302F	RES. METAL FILM	33K	1%	1/6W
R27	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R28	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R29	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R30	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R31	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R32	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R33	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R34	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R35	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R36	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R37	RN14BK2C2400F	RES. METAL FILM	240	1%	1/6W
R38	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R39	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R40	RN14BK2C1801F	RES. METAL FILM	1.8K	1%	1/6W
R41	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R42	RN14BK2C2400F	RES. METAL FILM	240	1%	1/6W
R43	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R44	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R45	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R46	NO USE				
R47	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R48	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R49	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R50	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R51	RD14BB2C134J	RES. CARBON	130K	5%	1/6W
R52	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R53	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R54	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R55	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R58	R90-0662-05	RES. NETWORK			
R59	R90-0661-05	RES. NETWORK	4X100K		
R60	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R61	RD14BB2C101J	RES. CARBON	100	5%	1/6W

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R62	R90-0663-05	RES. NETWORK	8X1M		
R63	NO USE				
R64	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R65	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R66	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R69	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R70	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R73	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R74	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R75	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R76	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R77	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R78	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R79	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R80	NO USE				
R81	RN14BK2C2001F	RES. METAL FILM	2K	1%	1/6W
R82	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R83	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R84	NO USE				
R85	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R86	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R87	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R88	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R89	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R90	R90-0286-05	RES. NETWORK	4X4.7K		
R91	R90-0415-05	RES. NETWORK	3X4.7K		
R92	R90-0286-05	RES. NETWORK	4X4.7K		
R256	R92-1061-05	JUMPING RES.	ZERO OHM (5MM)		
U1	MB8464A-15LL	IC,64K-BIT SRAM			
U2	MBM27C256*T	IC,256K-BIT EPROM			
U3	MSM6242BGS-VK	IC,REAL TIME CLOCK			
U4	PST518B	IC,RESET			
U5	LH0080A	IC,CPU			
U6	DTM-5010	IC, GATE ARRAY			
U7	HD74LS138FP	IC,3-TO-8 DEMULTIPLEXER			
U8	HD74HC238FP	IC,3-TO-8 LINE DECODER			
U9	HD74HC238FP	IC,3-TO-8 LINE DECODER			
U10	HD74HC107FP	IC,DUAL J-K FLIP-FLOP			
U11	HD74LS04FP	IC,HEX INVERTERS			
U12	HD74LS244FP	IC,OCTAL 3-STATE BUS BUFFER			
U13	HD74LS244FP	IC,OCTAL 3-STATE BUS BUFFER			
U14	HD74LS04FP	IC,HEX INVERTERS			
U15	HD74LS30FP	IC,8-INPUT NAND			
U16	HD74LS374FP	IC,OCTAL 3-STATE D-FF			
U17	HD74LS244FP	IC,OCTAL 3-STATE BUS BUFFER			
U18	HD74LS244FP	IC,OCTAL 3-STATE BUS BUFFER			
U19	HD14066BFP	IC,QUAD BILATERAL SWITCH			
U20	HD74LS107AFP	IC,QUAD JK-FF WITH CLEAR			
U21	HD74LS107AFP	IC,QUAD JK-FF WITH CLEAR			
U22	HD74LS107AFP	IC,QUAD JK-FF WITH CLEAR			
U23	HD74LS107AFP	IC,QUAD JK-FF WITH CLEAR			
U24	HD74LS30FP	IC,8-INPUT NAND			
U25	HD74LS11FP	IC,TRIPLE 3-INPUT AND			
U26	NJM555M	IC,TIMER			
U27	HD74LS157FP	IC,2 TO 1 DATA SELECTORS			

* * * PARTS LIST * * *

X77-1490-01

REF.NO	PARTS NO	NAME & DESCRIPTION
U28	HD74LS157FP	IC,2 TO 1 DATA SELECTORS
U29	HD74HC08FP	IC,QUAD 2-INPUT AND GATE
U30	HD74HC7266FP	IC,QUAD 2-INPUT NOR GATE
U31	HD74HC08FP	IC,QUAD 2-INPUT AND GATE
U32	MBM27C64*V	IC,64K-BIT EPROM
U33	CTM5020	IC,GATE ARRAY (R/O CONTROLLER)
U34	HD14051BFP	IC,8-CH ANALOG MPX/DE-MPX
U35	NJM311M	IC,VOLTAGE COMPARATOR
U36	HD74HC174FP	IC,HEX D-TYPE FLIP-FLOP
U37	AM6012DC	IC,12-BIT D/A CONVERTER
U38	HD74HC564FP	IC,OCTAL D-TYPE FLIP-FLOP
U39	HD74HC244FP	IC,OCTAL BUS BUFFER
U40	HD14052BFP	IC,DUAL 4-CH ANALOG MPX/DE-MPX
U41	HD14051BFP	IC,8-CH ANALOG MPX/DE-MPX
U42	DAC0808LCN	IC,8-BIT D/A CONVERTER
U43	HD14052BFP	IC,DUAL 4-CH ANALOG MPX/DE-MPX
U44	NJM072M	IC,DUAL J-FET INPUT OP AMP
U45	NJM072M	IC,DUAL J-FET INPUT OP AMP
U46	NJM072M	IC,DUAL J-FET INPUT OP AMP
U47	NJM072M	IC,DUAL J-FET INPUT OP AMP
X1	L78-0107-05	CERAMIC RESONATOR (10MHZ)
X2	L77-1229-05	CRYSTAL (SUB L77-1025-05)

*** PARTS LIST ***

X77-1500-01 (CONNECTION UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION
	J73-0012-03	PCB (UNMOUNTED)
P3	E40-7034-05	PIN CONNECTOR 40P
P10	E40-7036-05	PIN CONNECTOR 20P
P11	NO USE	
P12	E38-0072-05	LEAD WIRE WITH CONNECTOR 10P
P13	E38-0071-05	LEAD WIRE WITH CONNECTOR 6P
P17	E38-0073-05	LEAD WIRE WITH CONNECTOR 11P
P18	E40-7034-05	PIN CONNECTOR 40P
P19	E38-0074-05	LEAD WIRE WITH CONNECTOR 12P
P34	E40-7122-05	PIN CONNECTOR 10P

*** PARTS LIST ***

X80-1100-02 (FINAL UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	F01-0866-04	HEAT SINK			
	F02-0502-04	HEAT SINK			
	J25-5196-13	PCB (UNMOUNTED)			
	N09-0718-05	SCREW,SEMS PAN HD M3X6			
	N89-3008-41	SCREW, BINDING TAP TITE M3X8			
C1	CK45FB1H102K	CAP. CERAMIC	1000P	10%	50V
C2	C91-1275-05	CAP. ELECTRO	0.033F		5.5V
C3	C91-1275-05	CAP. ELECTRO	0.033F		5.5V
C4	CQ92FM1H472K	CAP. MYLAR	4700P	10%	50V
C5	CE04HW1H010M	CAP. ELECTRO	1	20%	50V
C6	CC45FCH1H330J	CAP. CERAMIC	33P	5%	50V
C7	CC45FCH1H080D	CAP. CERAMIC	8P	0.5P	50V
C8	NO USE				
C9	CC45FCH1H150J	CAP. CERAMIC	15P	5%	50V
C10	CC45FCH1H390J	CAP. CERAMIC	39P	5%	50V
C11	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C12	CQ92M1H104K	CAP. MYLAR	0.1	10%	50V
C13	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C14	CC45FSL1H561J	CAP. CERAMIC	560P	5%	50V
C15	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C103	CC45FCH1H020C	CAP. CERAMIC	2P	0.25P	50V
C104	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C105	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C108	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C109	CC45CH2H010C	CAP. CERAMIC	1P	0.25P	500V
C110	CC45FCH2H0R5C	CAP. CERAMIC	0.5P	0.25P	500V
C111	CF93AN2E103K	CAP. METAL FILM	0.01	10%	250V
C112	CF93AN2E103K	CAP. METAL FILM	0.01	10%	250V
C113	CF93AN2E104K	CAP. METAL FILM	0.1	10%	250V
C114	CF93AN2E104K	CAP. METAL FILM	0.1	10%	250V
C115	CC45FCH1H040C	CAP. CERAMIC	4P	0.25P	50V
C116	CE04HW1E220M	CAP. ELECTRO	22	20%	25V
C301	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C302	CE04EW1C331M	CAP. ELECTRO	330	20%	16V
C303	CE04EW1E101M	CAP. ELECTRO	100	20%	25V
C304	CE04EW2A220M	CAP. ELECTRO	22	20%	100V
C305	CE04W2E4R7M	CAP. ELECTRO	4.7	20%	250V
C306	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C307	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C308	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C309	CQ92FM1H104K	CAP. MYLAR	0.1	10%	50V
C310	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C311	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C312	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C313	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C314	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C901	CQ92M1H102K	CAP. MYLAR	1000P	10%	50V
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D101	TLR112	LED,RED			
D102	MA700	DIODE			
D105	MA700	DIODE			

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION
D106	TLR112	LED,RED
D107	1SS132	DIODE
D108	1SS132	DIODE
D201	1SS132	DIODE
D202	1SS132	DIODE
L1	L33-0806-05	CHOKE COIL (0.52UH)
L2	L33-0806-05	CHOKE COIL (0.52UH)
L3	L40-2282-70	FERRI INDUCTOR 0.22UH
L4	L40-2282-70	FERRI INDUCTOR 0.22UH
L5	L40-2202-70	FERRI INDUCTOR 22UH
P11	E40-3238-05	PIN CONNECTOR 3P
P12	E40-5067-05	PIN CONNECTOR 10P
P13	E40-3241-05	PIN CONNECTOR 6P
P14	E40-3238-05	PIN CONNECTOR 3P
P15	E40-3238-05	PIN CONNECTOR 3P
Q1	2SC3779(D)	TR. SI, NPN
Q2	2SC3779(D)	TR. SI, NPN
Q3	2SC3779(D)	TR. SI, NPN
Q4	2SC3779(D)	TR. SI, NPN
Q5	2SA1161	TR. SI, PNP
Q6	2SA1161	TR. SI, PNP
Q7	2SC3779(D)	TR. SI, NPN
Q8	2SC3779(D)	TR. SI, NPN
Q9	2SC3779(D)	TR. SI, NPN
Q10	2SC3779(D)	TR. SI, NPN
Q11	2SC3779(D)	TR. SI, NPN
Q12	2SC3779(D)	TR. SI, NPN
Q13	2SC1164(O)*S	TR. SI, NPN
Q14	2SC1164(O)*S	TR. SI, NPN
Q101	2SA1005(K)	TR. SI, PNP
Q102	2SA1005(K)	TR. SI, PNP
Q103	2SC3315(C)	TR. SI, NPN
Q104	2SC3315(C)	TR. SI, NPN
Q105	2SA1005(K)	TR. SI, PNP
Q106	2SA1005(K)	TR. SI, PNP
Q107	2SA1005(K)	TR. SI, PNP
Q108	2SA1005(K)	TR. SI, PNP
Q109	2SC3354(T,S)	TR. SI, NPN
Q110	2SC3354(T,S)	TR. SI, NPN
Q111	2SA1206	TR. SI, PNP
Q112	2SC3354(T,S)	TR. SI, NPN
Q113	2SC3354(T,S)	TR. SI, NPN
Q114	2SC3600(E,F)	TR. SI, NPN
Q115	2SC3600(E,F)	TR. SI, NPN
Q116	2SA1406(E,F)	TR. SI, PNP
Q117	2SA1406(E,F)	TR. SI, PNP
Q201	2SC3315(C)	TR. SI, NPN
Q202	2SC3315(C)	TR. SI, NPN
Q203	2SC3354(T,S)	TR. SI, NPN
Q204	2SC3354(T,S)	TR. SI, NPN
Q205	2SC2785(F)	TR. SI, NPN
Q206	2SC3315(C)	TR. SI, NPN
Q207	2SC3315(C)	TR. SI, NPN

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
Q208	2SC3354(T,S)	TR. SI, NPN			
Q209	2SC3354(T,S)	TR. SI, NPN			
Q210	2SC2785(F)	TR. SI, NPN			
R1	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R2	RN14BK2C1000F	RES. METAL FILM	100	1%	1/6W
R3	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R4	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R5	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R6	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R7	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R8	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R9	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R10	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R11	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R12	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R13	RD14BB2C303J	RES. CARBON	30K	5%	1/6W
R14	RD14BB2C753J	RES. CARBON	75K	5%	1/6W
R15	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R16	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R17	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R18	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R19	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R20	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R21	RN14BK2C3000F	RES. METAL FILM	300	1%	1/6W
R22	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R23	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R24	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R25	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R26	RN14BK2C2201F	RES. METAL FILM	2.2K	1%	1/6W
R27	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R28	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R29	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R30	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R31	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R32	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R33	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R34	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R35	RN14BK2E82R0F	RES. METAL FILM	82.0	1%	1/4W
R36	RN14BK2E82R0F	RES. METAL FILM	82.0	1%	1/4W
R37	RN14BK2C3600F	RES. METAL FILM	360	1%	1/6W
R38	NO USE				
R39	RD14BB2C513J	RES. CARBON	51K	5%	1/6W
R40	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R41	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R42	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R43	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R44	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R45	RD14BB2E220J	RES. CARBON	22	5%	1/4W
R46	RD14BB2E220J	RES. CARBON	22	5%	1/4W
R47	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R48	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R49	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R50	R92-1420-05	RES. METAL FILM	510	5%	7W
R51	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R52	R92-1420-05	RES. METAL FILM	510	5%	7W
R53	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R54	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R55	RD14BB2C301J	RES. CARBON	300	5%	1/6W

*** PARTS LIST ***

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R56	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R59	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R101	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R102	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R103	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R104	RN14BK2C4300F	RES. METAL FILM	430	1%	1/6W
R105	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R106	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R107	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R108	RN14BK2C5101F	RES. METAL FILM	5.1K	1%	1/6W
R109	RN14BK2C1201F	RES. METAL FILM	1.2K	1%	1/6W
R110	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R111	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R112	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R113	RD14BB2C431J	RES. CARBON	430	5%	1/6W
R114	RD14BB2C431J	RES. CARBON	430	5%	1/6W
R115	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R116	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R117	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R118	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R119	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R120	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W
R121	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R122	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R123	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R124	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R125	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R126	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R127	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R128	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R129	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W
R130	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R131	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R132	RN14BK2C1301F	RES. METAL FILM	1.3K	1%	1/6W
R133	RN14BK2C1301F	RES. METAL FILM	1.3K	1%	1/6W
R134	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R135	NO USE				
R136	RD14BB2C514J	RES. CARBON	510K	5%	1/6W
R137	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R138	RD14BB2C242J	RES. CARBON	2.4K	5%	1/6W
R139	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R140	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R141	RD14BB2C152J	RES. CARBON	1.5K	5%	1/6W
R142	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R143	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R144	RN14BK2E2002F	RES. METAL FILM	20K	1%	1/4W
R145	RN14BK2E2002F	RES. METAL FILM	20K	1%	1/4W
R146	R92-1434-05	RES. SPECIAL POWER	47K	5%	1/2W
R147	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R148	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R149	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R150	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W
R151	RN14BK2C3601F	RES. METAL FILM	3.6K	1%	1/6W
R152	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R153	RN14BK2E2002F	RES. METAL FILM	20K	1%	1/4W
R154	RN14BK2E2002F	RES. METAL FILM	20K	1%	1/4W
R155	R92-1434-05	RES. SPECIAL POWER	47K	5%	1/2W

* * * PARTS LIST * * *

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REF.NO	PARTS NO	NAME & DESCRIPTION			
R156	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R157	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R158	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R159	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R160	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R161	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R162	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R163	NO USE				
R164	RD14BB2C203J	RES. CARBON	20K	5%	1/6W
R201	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R202	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R203	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R204	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W
R205	RD14BB2C621J	RES. CARBON	620	5%	1/6W
R206	RD14BB2C623J	RES. CARBON	62K	5%	1/6W
R207	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R208	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R209	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R210	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R211	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R212	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R213	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R214	RN14BK2C1800F	RES. METAL FILM	180	1%	1/6W
R215	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R216	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R217	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R218	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R219	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R220	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R221	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R222	RD14BB2C301J	RES. CARBON	300	5%	1/6W
R223	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R224	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R225	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R226	RN14BK2C9101F	RES. METAL FILM	9.1K	1%	1/6W
R227	RN14BK2C4701F	RES. METAL FILM	4.7K	1%	1/6W
R228	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W
R229	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
TC1	C05-0471-05	CAP. TRIMMER	30P		
TC2	C05-0460-05	CAP. TRIMMER	20P		
TC101	C05-0464-05	CAP. TRIMMER	2P		
TC102	NO USE				
TC103	C05-0464-05	CAP. TRIMMER	2P		
TH2	SDT100	THERMISTOR			
VR1	R12-1538-05	RES. SEMI FIXED	1KB		
VR2	NO USE				
VR3	R12-3453-05	RES. SEMI FIXED	10KB		
VR4	R12-0058-05	RES. SEMI FIXED	470 B		
VR101	R12-1538-05	RES. SEMI FIXED	1KB		
VR102	R12-0571-05	RES. SEMI FIXED	500B		
VR103	R12-3453-05	RES. SEMI FIXED	10KB		
VR201	R12-3543-05	RES. SEMI FIXED	20KB		

* * * PARTS LIST * * *

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REF.NO	PARTS NO	NAME & DESCRIPTION
VR202	R12-3543-05	RES. SEMI FIXED 20KB

*** PARTS LIST ***

X81-2330-02 (VOLUME UNIT)

REF.NO	PARTS NO	NAME & DESCRIPTION			
	F01-0859-14	HEAT SINK			
	J21-4610-04	BRACKET			
	J73-0011-13	PCB (UNMOUNTED)			
	N09-0623-04	SCREW, SEMS	M3X8		
	R92-0150-05	JUMPING RES.	ZERO OHM(10MM)		
C6	CE04EW1C101M	CAP. ELECTRO	100	20%	16V
C7	CK45F1H103Z	CAP. CERAMIC	0.01		50V
C8	CK45FB2H472K	CAP. CERAMIC	4700P	10%	500V
C9	CQ92M1H103J	CAP. MYLAR	0.01	5%	50V
C10	CE04EW1C470M	CAP. ELECTRO	47	20%	16V
C101	C91-0551-05	CAP. POLYESTER	0.22	10%	630V
C102	C91-0575-05	CAP. CERAMIC	1000P		4KV
C103	C91-0575-05	CAP. CERAMIC	1000P		4KV
D1	1SS132	DIODE			
D2	1SS132	DIODE			
D3	MTZ24JC	DIODE, ZENER	23.72V		
J21	E31-5571-05	LEAD WIRE WITH CONNECTOR			
L101	L33-0808-05	CHOKE COIL			
P20	E40-0328-05	PIN CONNECTOR	3 P		
P21	E40-0328-05	PIN CONNECTOR	3 P		
P25	E40-3301-05	PIN CONNECTOR	4P		
P26	E40-3307-05	PIN CONNECTOR	10P		
P27	E40-3237-05	PIN CONNECTOR	2P		
P28	E40-3299-05	PIN CONNECTOR	2P		
P29	E40-3299-05	PIN CONNECTOR	2P		
Q1	2SC2271(D)	TR. SI, NPN			
Q2	2SC1384(Q)	TR. SI, NPN			
Q3	2SA684(Q)	TR. SI, PNP			
Q4	2SA1175(F)	TR. SI, PNP			
Q5	2SC2785(F)	TR. SI, NPN			
Q6	2SD1666(S)	TR. SI, NPN			
R1	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R2	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R3	RD14BB2C183J	RES. CARBON	18K	5%	1/6W
R4	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R5	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R6	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R7	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R8	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R9	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R10	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R11	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R12	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R13	RD14BB2C433J	RES. CARBON	43K	5%	1/6W
R14	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R15	RD14BB2C162J	RES. CARBON	1.6K	5%	1/6W
R16	RD14BB2C182J	RES. CARBON	1.8K	5%	1/6W
R17	RD14BB2C271J	RES. CARBON	270	5%	1/6W
R18	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R19	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W
R20	RD14BB2C473J	RES. CARBON	47K	5%	1/6W

* * * PARTS LIST * * *

X81-2330-02

REF.NO	PARTS NO	NAME & DESCRIPTION			
R21	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R22	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R23	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R24	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R25	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R26	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R101	RD14BY2H225J	RES. CARBON	2.2M	5%	1/2W
S101	S59-2505-05	SWITCH			
U1	NJM4558D	IC,DUAL OP AMP			
VR1	R05-3515-05	V.R. WITH SW(READOUT INT) 20KB			
VR2	R10-3505-05	V.R.(A/B INT,ROT+ILLUM)20KB X2			
VR3	R10-7501-05	V.R.(FOCUS/ASTIG)500KB/500KB			
VR4	R10-3505-05	V.R.(A/B INT,ROT+ILLUM)20KB X2			
VR5	R12-3543-05	RES. SEMI FIXED 20KB			
VR6	R12-1538-05	RES. SEMI FIXED 1KB			

ADJUSTMENT

1.INTRODUCTION:

The following adjustment required an accurate measuring instrument and an insulated adjusting flat blade screwdriver. If it is not available, contact with KENWOOD. For optimum adjustment, turn the power on and warm-up the scope suficiently before starting.(more than 30 minutes)

Before adjusting the scope, check the power supply voltage.

2.TEST EQUIPMENT REQUIRED:

The following test equipment and accessories, or its equivalent, is required for complete adjustment of the CS-6040. The equipment specifications given are the minimum necessary for accurate adjustment and may be less than those of the listed test equipment. The test equipment must be operating within the listed specifications and correctly adjusted.

If equipment substitutes are made, the adjustment setup may have to be altered to fit the requirements of that equipment. Detailed operating instruction for the test equipment are not given in this procedure. Refer to the test equipment instruction manual if further instruction is needed.

ADJUSTMENT

Description	Model	
Digital Multimeter	DL-720	KENWOOD
Square-wave Generator	PG-506	Tektronix
Time Marker Generator	TG-501	Tektronix
Sine-wave Generator	SG-502	Tektronix
Sine-wave Generator	SG-503	Tektronix
Square-wave Generator	211B	HP
Capacitance Meter	TSC-1100	-
Oscilloscope	485	Tektronix
Color Pattern Generator	CG-911A	KENWOOD
Power Consumption Meter	2014	Yokogawa
Frequency Counter	FC-756	KENWOOD
Sweep Generator	M-1062	WAVE TEK
Termination	-	50 ohm, Accuracy:Within 3%

ADJUSTMENT

3.PREPARATION FOR ADJUSTMENT:

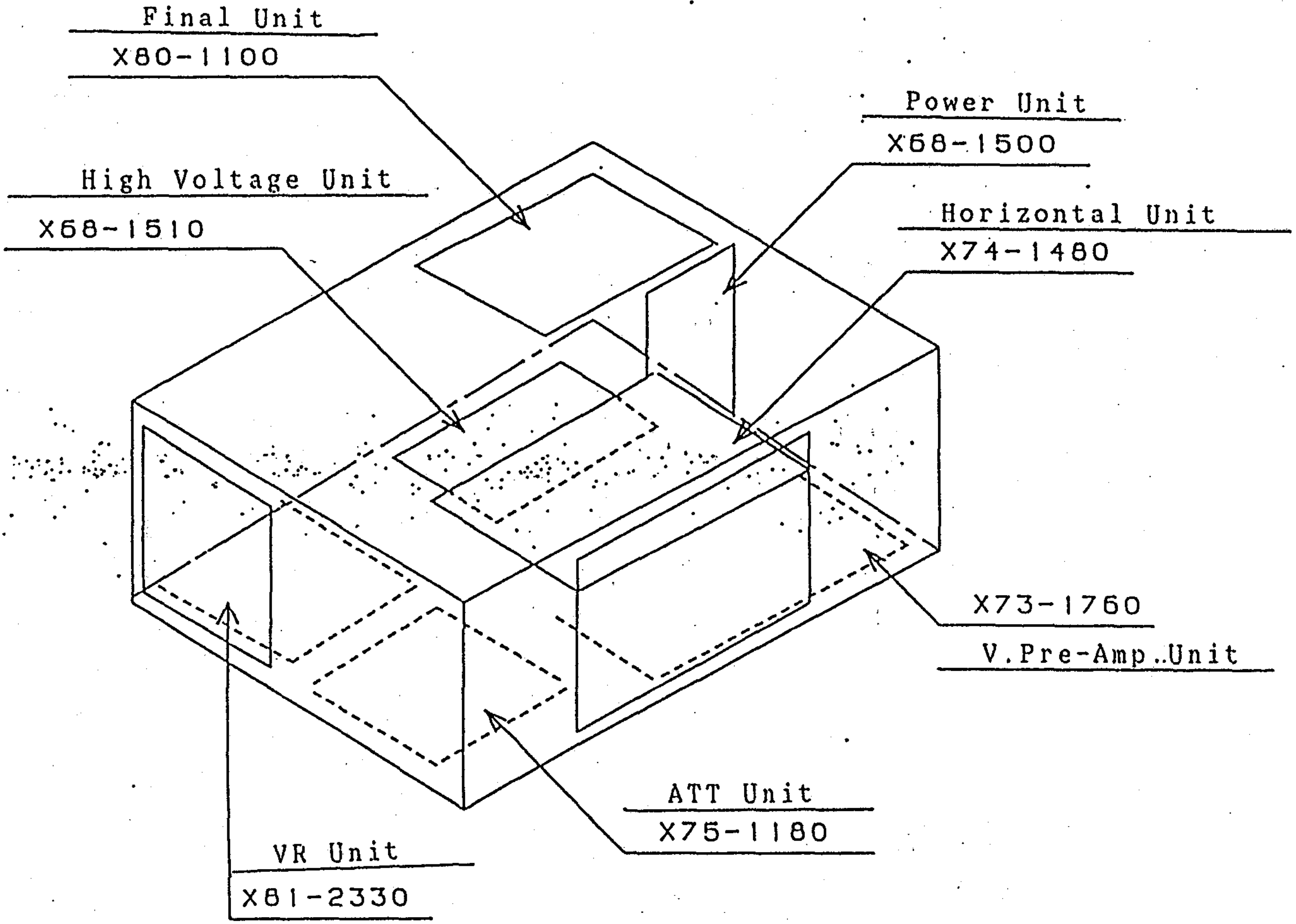
1)Setting position of knob

Title of Knob	Setting Position
CURSORS	OFF
V-MODE	CH1
VOLTS/DIV	10mA(Both Channels)
AC-DC	DC(Both Channels)
GND	ON(Both Channels)
V-POSITION	12 o'clock(mechanical center, all channels)
V-VARIABLE	CAL(Both Channels)
A.TRIG SOURCE	VERT & CH1
A.TRIG COUPLING	AC
TRIG MODE	AUTO
HORIZONTAL MODE	A
SWEEP TIME/DIV	1ms.
H-VARIABLE	12 o'clock(mechanical center)
MAG10	OFF
CH3	0.1V
CH4	0.1V
TRIG COUNT	OFF

ADJUSTMENT

Title of Knob	Setting Position
D.T.M.	OFF
TRIG LEVEL	12 o'clock(mechanical center, A & B)

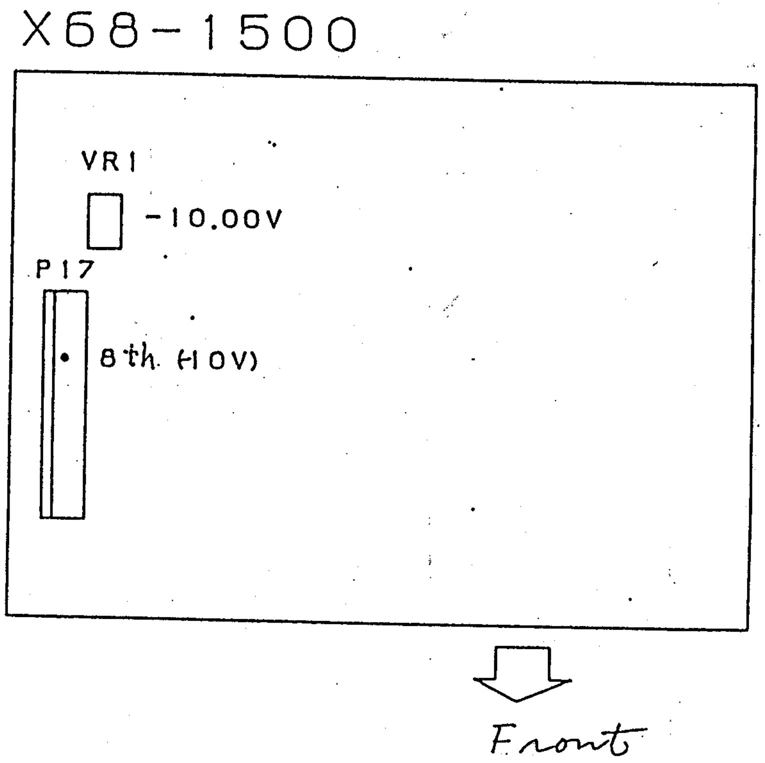
4.Allocation of P.C.B.


Final Unit
X80-1100
Power Unit
X68-1500
High Voltage Unit
X68-1510
Horizontal Unit
X74-1480
X73-1760
V.Pre-Amp.Unit
ATT Unit
X75-1180
VR Unit
X81-2330

5.Allocation of Adjustment Components

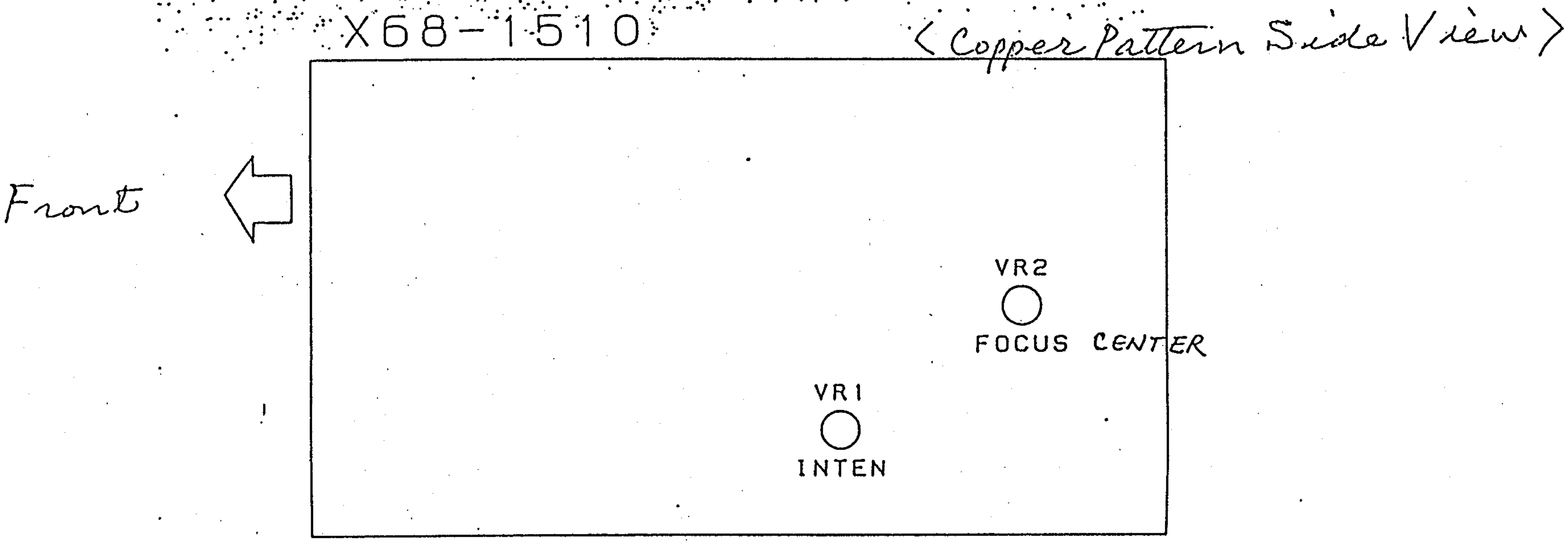
1)Power Unit/X68-1500

<Component Side View>


X68-1500
VR1
-10.00V
P17
8th (-10V)
Front

ADJUSTMENT

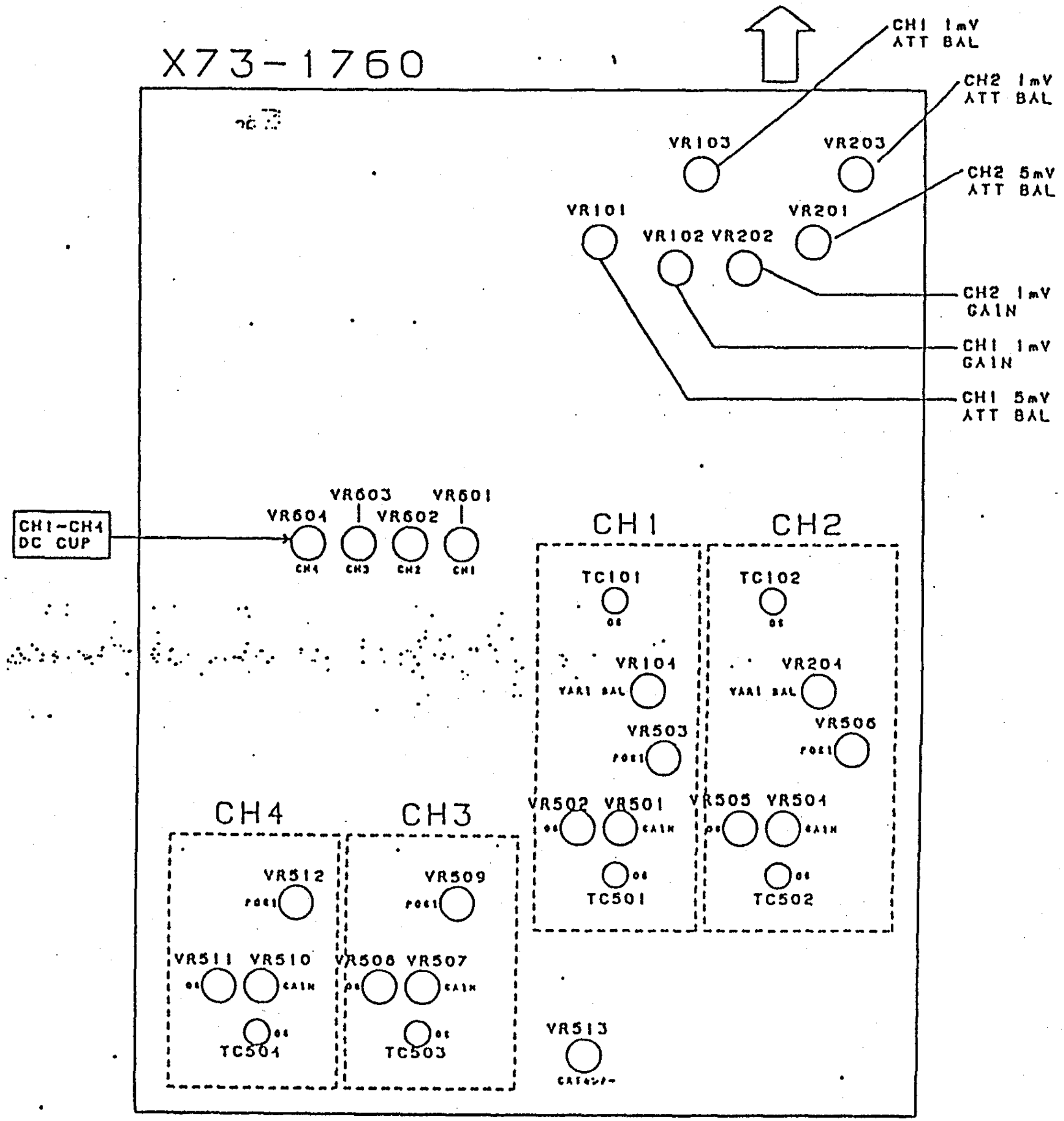
2)High Voltage Unit/X68-1510


X68-1510
< Copper Pattern Side View >
Front
VR2
FOCUS
CENTER
VR1
INTEN

ADJUSTMENT

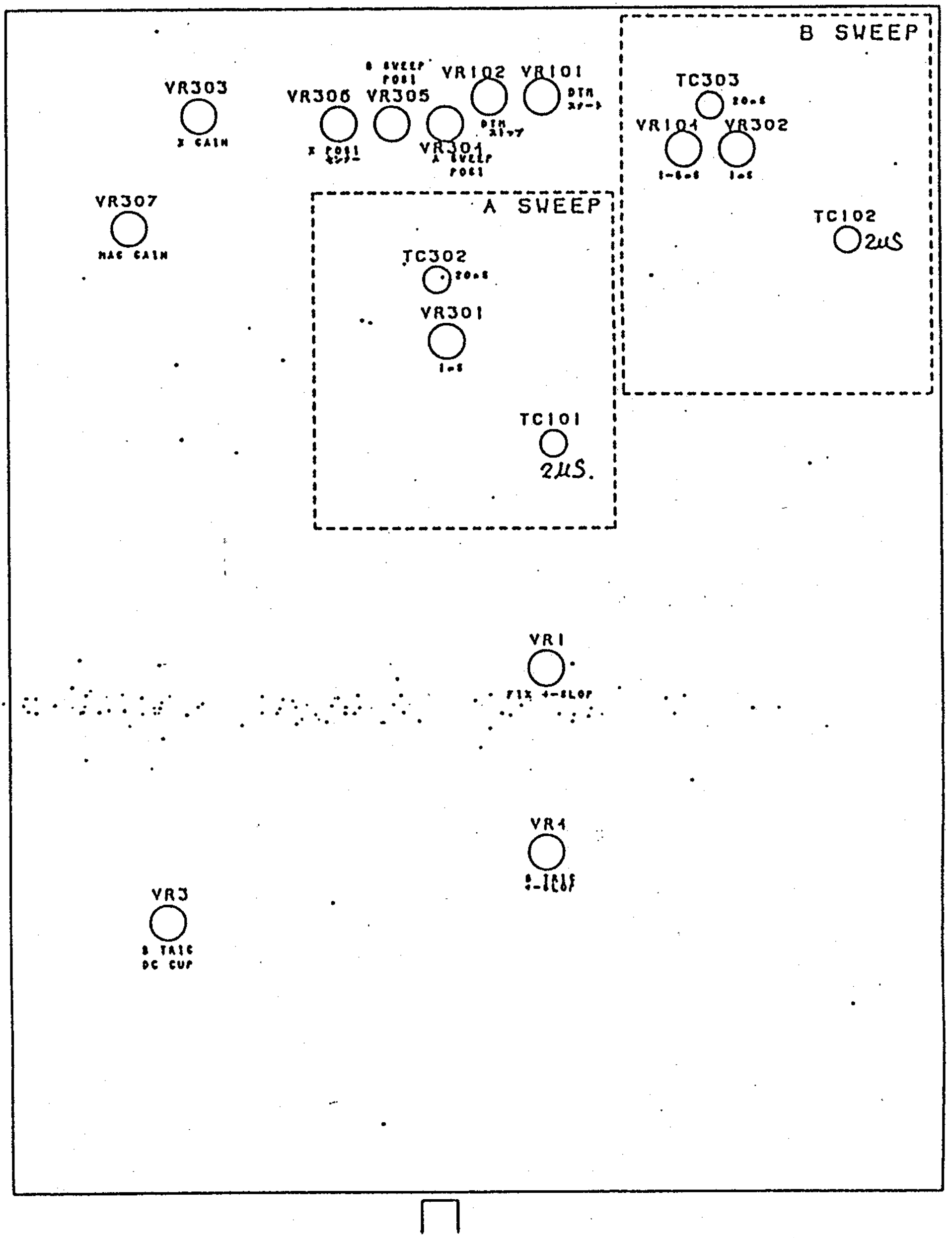
3)Pre-amp.Unit/X73-1760

<Component Side View>


X73-1760
CH1 1mV ATT BAL
CH2 1mV ATT BAL
CH2 5mV ATT BAL
CH2 1mV GAIN
CH1 1mV GAIN
CH1 5mV ATT BAL
VR103
VR203
VR101
VR201
VR102
VR202
CH1-CH4 DC CUP
VR604
VR603
VR602
VR601
CH4
CH3
CH2
CH1
CH1
CH2
TC101
DC
TC102
DC
VR104
VARI BAL
VR204
VARI BAL
VR503
POSI
VR506
POSI
VR502
DC
VR501
GAIN
VR505
DC
VR504
GAIN
DC
TC501
DC
TC502
CH4
CH3
VR512
POSI
VR509
POSI
VR511
DC
VR510
GAIN
VR508
DC
VR507
GAIN
DC
TC504
DC
TC503
VR513

ADJUSTMENT

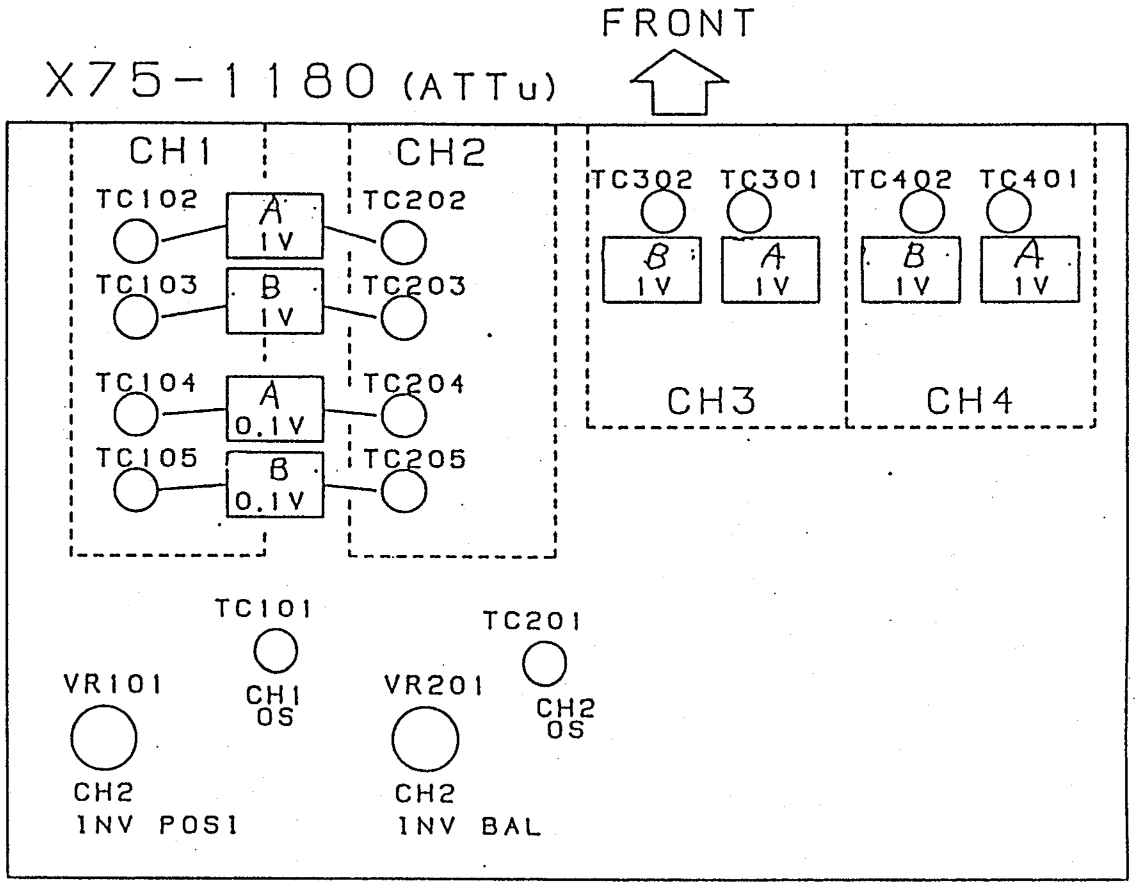
4)Horizontal Unit/X74-1480


B SWEEP
A SWEEP
VR303
X GAIN
VR306
X POSI
VR305
B SWEEP POSI
VR102
DTM ストップ
VR101
DTM スタート
VR301
A SWEEP POSI
TC303
20nS
VR104
VR302
TC102
2µS
VR307
MAG GAIN
TC302
20nS
VR301
TC101
2µS.
VR1
FIX +-SLOP
VR4
B TRIG +-SLOP
VR3
B TRIG DC CUP

ADJUSTMENT

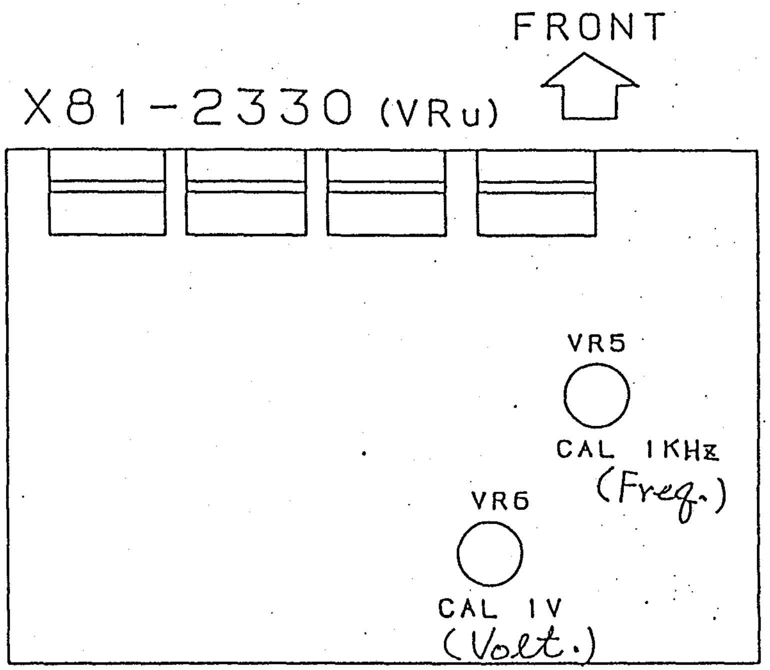
5)ATT Unit/X75-1180

A : Input Capacity B : Waveform Shaping

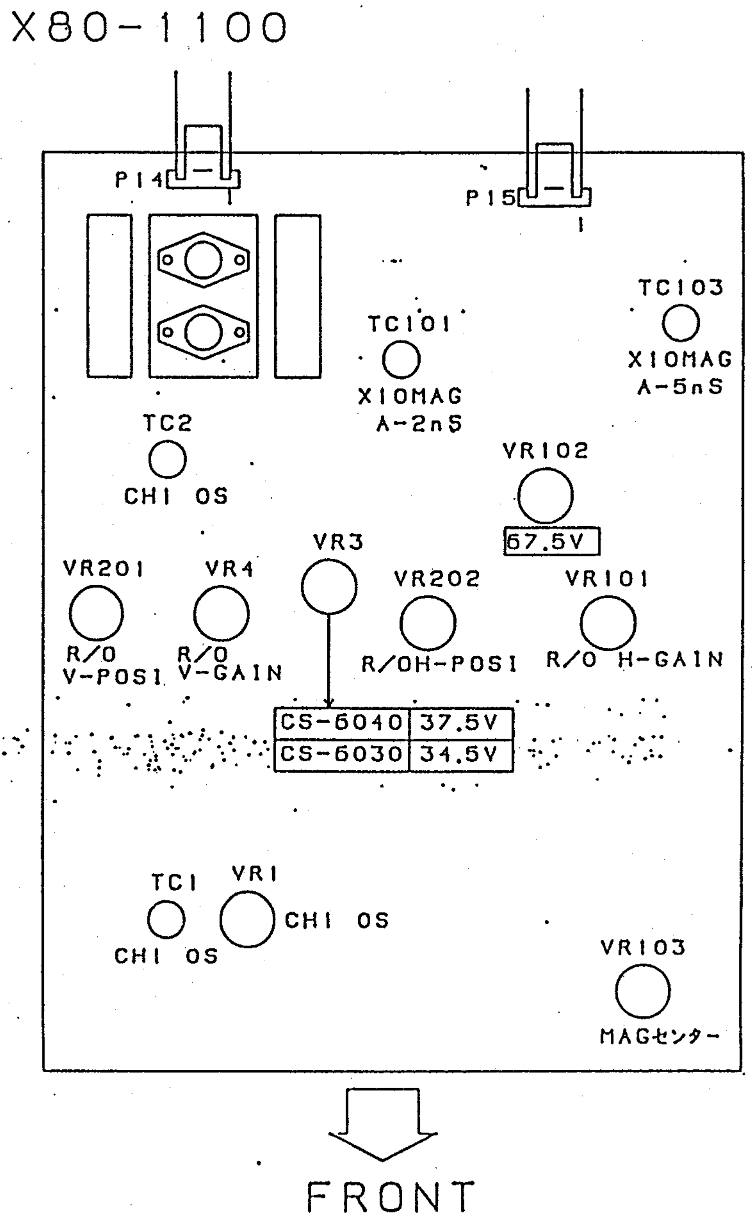

FRONT
X75-1180 (ATTu)
CH1
CH2
TC102
A 1V
TC202
TC103
B 1V
TC203
TC104
A 0.1V
TC204
TC105
B 0.1V
TC205
TC302
TC301
TC402
TC401
B 1V
A 1V
B 1V
A 1V
CH3
CH4
TC101
CH1 OS
TC201
CH2 OS
VR101
CH2 INV POSI
VR201
CH2 INV BAL

ADJUSTMENT

6)VR Unit/X81-2330


FRONT
X81-2330 (VRu)
VR5
CAL 1KHz
(Freq.)
VR6
CAL 1V
(Volt.)

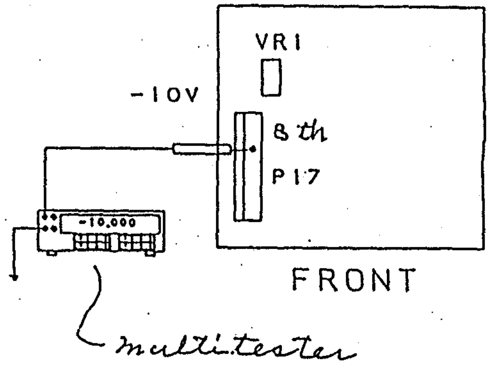
7)Final Unit/X80-1100

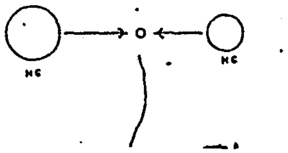

X80-1100
P14
1
P15
1
TC103
X10MAG
A-5nS
TC101
X10MAG
A-2nS
TC2
CH1 OS
VR102
67.5V
VR3
VR201
R/O
V-POSI
VR4
R/O
V-GAIN
VR202
R/OH-POSI
VR101
R/O H-GAIN
CS-6040 37.5V
CS-6030 34.5V
TC1
CH1 OS
VR1
CH1 OS
VR103
MAGセンター
FRONT

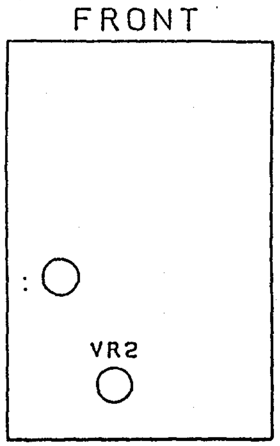
ADJUSTMENT

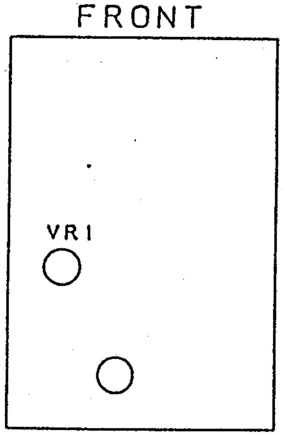
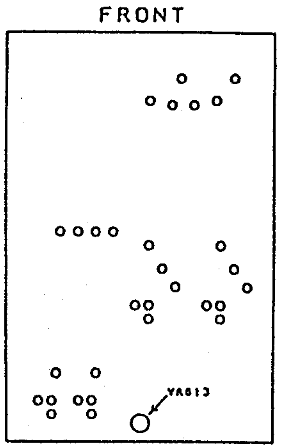
6.Adjustment

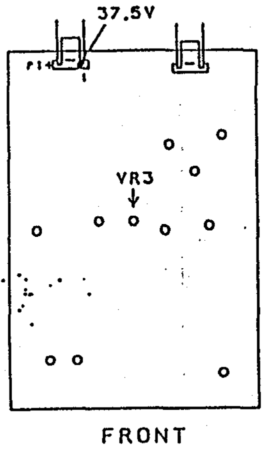
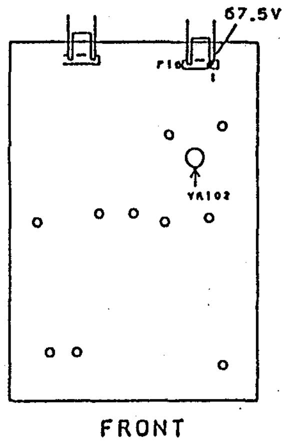
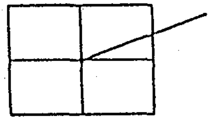
ITEM	ADJ.PART	TEST POINT	PROCEDURE
01)Power Voltage	VR1/X68-1500 Upper Side	8-pin/P17	-10V(tolerance:-10.00 to -10.05)
02)Focus Center	VR2/X68-1510 Lower Side	on CRT	FOCUS : Mechanical Center(Push), X-Y. The spot on CRT should be adjusted to optimum point as minimum round.


VR1
-10V
8th
P17
-10.000
FRONT
multitester

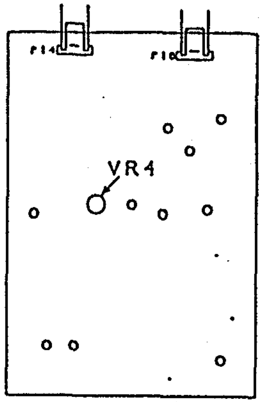
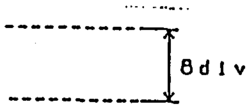
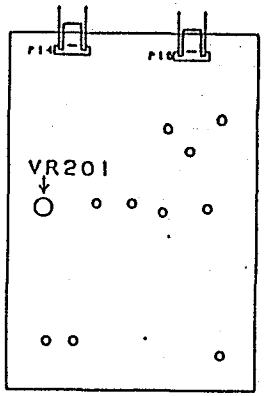
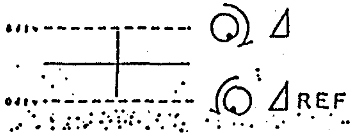




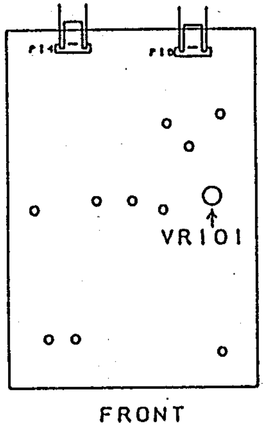
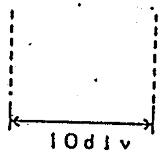
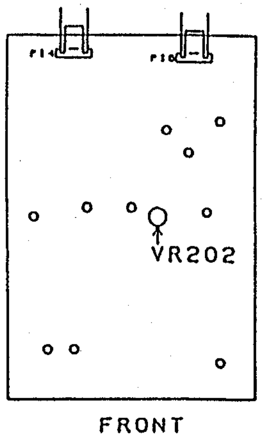
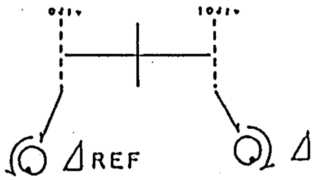
ITEM	ADJ.PART	TEST POINT	PROCEDURE
03)Intensity	VR1/X68-1510 Lower Side	on CRT	X-Y, INTEN : 9:30o'clock To adjust VR1 so that the spot disappear.
			
04)CRT Center	VR513/X73-1760 Lower Side	on CRT	V.MODE:CH1.CH2,ADD AC-DC:GND(Both CH) VOLTS:10mV(Both CH) Search position to be plied up the luminance-line above the other. Adjust luminance-line to be at center of CRT.
			

ITEM	ADJ.PART	TEST POINT	PROCEDURE
05)Y Operating Point	VR3/X80-1100 Upper Side	1st pin/P14 	V.MODE:CH1.CH2,ADD AC-DC:GND(Both CH) VOLTS:10mV(Both CH) Turn R/O off. Adjust the VR3 to be 37.5V. (Sweep Condition)
06)X Operating Point	VR102/X80-1100 Upper Side	1st pin/P15 	V.MODE:CH1 H.MODE:X-Y AC-DC:GND(Both CH) VOLTS:10mV(Both CH) Locate luminance-spot to be center of CRT Adjust the VR102 to be 67.5V. 

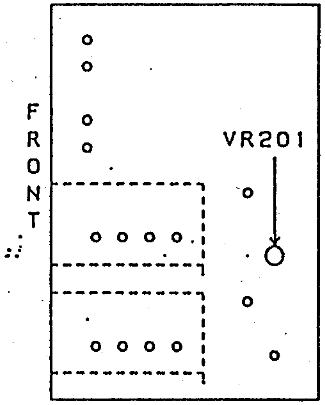
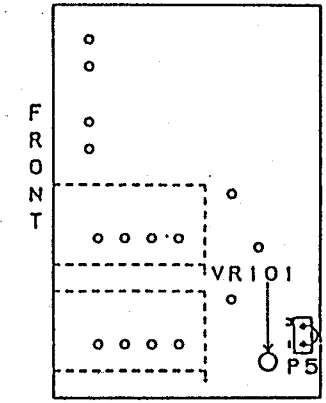
ADJUSTMENT

ITEM	ADJ.PART	TEST POINT	PROCEDURE
07)R/O Gain V	VR4/X80-1100 Upper Side  F14 F10 VR4 FRONT	on CRT	ΔV1:ON ΔVR:MAX R/O INTEN:Option Adjust interval of cursor-lines to be 8-div. 
08)R/O POSI V	VR201/X80-1100 Upper Side  F14 F10 VR201 FRONT	on CRT	Adjust cursor-lines to be fit on the scale on above condition(No.07). 

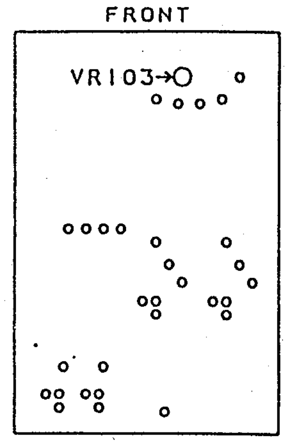
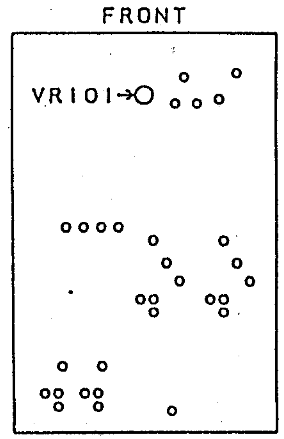
ADJUSTMENT

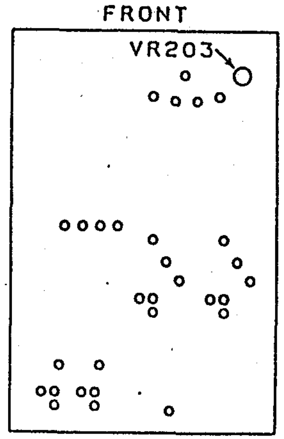
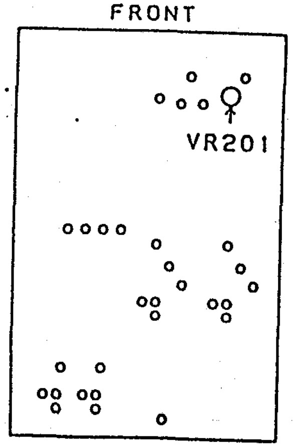
ITEM	ADJ.PART	TEST POINT	PROCEDURE
09)R/O Gain H	VR101/X80-1100 Upper Side  VR101 FRONT	on CRT	ΔT:ON ΔVR:MAX R/O INTEN:Option Adjust interval of cursor-lines to be 10-div. 
10)R/O POSI H	VR202/X80-1100  VR202 FRONT	on CRT	Adjust cursor-lines to be fit on the scale on above condition(No.09).  0div 10div ΔREF Δ

ADJUSTMENT

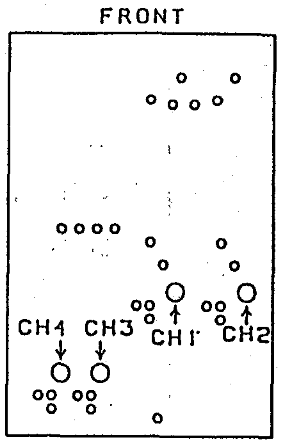
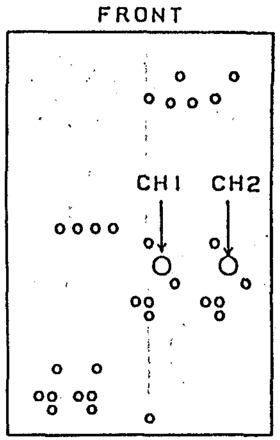
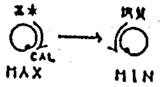
ITEM	ADJ.PART	TEST POINT	PROCEDURE
11)CH2 INV BAL	VR201/X75-1180 on CRT Lower Side 		V.MODE:CH2 VOLTS:10mV AC-DC:GND Adjust to do not vary when turn CH2 INV SW on and off.
12)CH2 INV POSI	VR101/X75-1180 on CRT Lower Side 		V.MODE:CH1,CH2,ADD VOLTS:10mV AC-DC:GND Short between 1st-pin and 3rd-pin of P5. Locate luminance-lines at center of CRT. Open between 1st-pin and 3rd-pin of P5. Adjust luminance-lines at center of CRT.

ADJUSTMENT

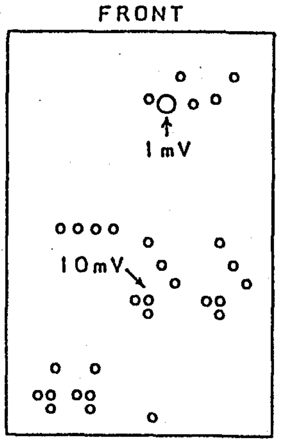
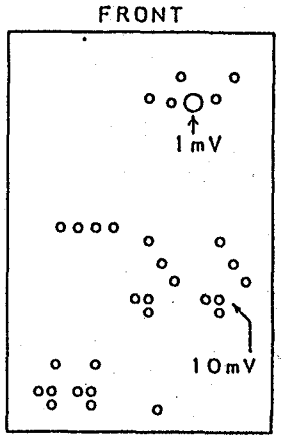
ITEM	ADJ.PART	TEST POINT	PROCEDURE
13)CH1 STEP ATT BAL (1 to 2mV)	VR103/X73-1760 on CRT Lower Side		V.MODE:CH1 H.MODE:A AC-DC:GND VOLTS:2mV Adjust to do not vary luminance-line when switch 1mV to 2mV.
14)CH1 STEP ATT BAL (2 to 5mV)	VR101/X73-1760 on CRT Lower Side		V.MODE:CH1 H.MODE:A AC-DC:GND VOLTS:2mV Adjust to do not vary luminance-line when switch 2mV to 5mV.

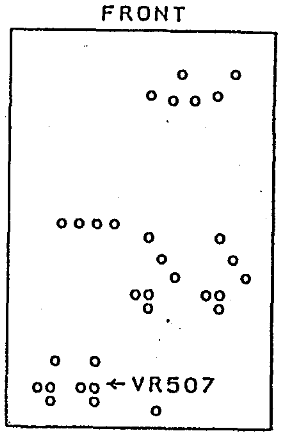
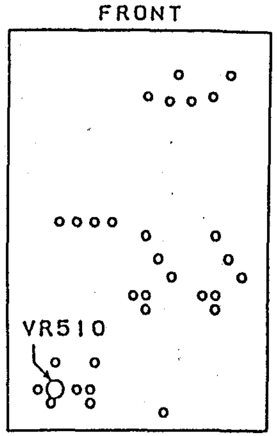
ITEM	ADJ.PART	TEST POINT	PROCEDURE
15)CH2 STEP ATT BAL (1 to 2mV)	VR203/X73-1760 Lower Side	on CRT 	V.MODE:CH2 H.MODE:A AC-DC:GND VOLTS:2mV Adjust to do not vary luminance-line when switch 1mV to 2mV.
16)CH2 STEP ATT BAL (2 to 5mV)	VR201/X73-1760 Lower Side	on CRT 	V.MODE:CH2 H.MODE:A AC-DC:GND VOLTS:2mV Adjust to do not vary luminance-line when switch 2mV to 5mV.

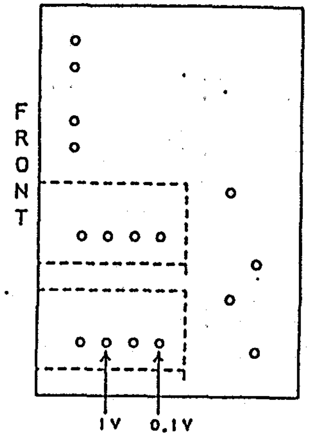
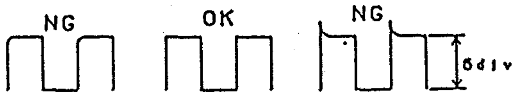
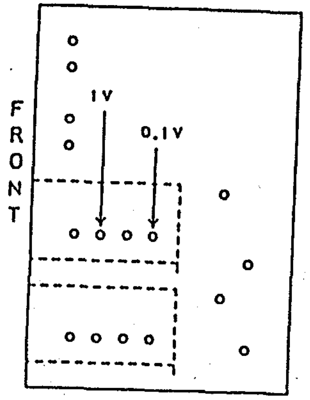
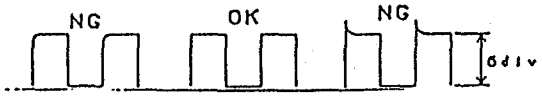
ADJUSTMENT

ITEM	ADJ.PART	TEST POINT	PROCEDURE
17)POSI CENTER (CH1 to CH4)	X73-1760 VR503(CH1) VR506(CH2) VR509(CH3) VR512(CH4) Lower Side	on CRT 	V.MODE:CH1,2,3,4 H.MODE:A AC-DC:GND VOLTS:10mV Locate POSI to be the mechanical center on each channels. Adjust luminance-lines to be center of CRT.
18)VALIABLE BAL (CH1,2)	X73-1760 VR104(CH1) VR204(CH2) Lower Side	on CRT 	V.MODE:CH1,2 H.MODE:A AC-DC:GND VOLTS:10mV Adjust to do not vary luminance-line when control VARIABLE VR max. to min.. 

ADJUSTMENT

ITEM	ADJ.PART	TEST POINT	PROCEDURE
19)CH1 V.GAIN	X73-1760 VR501(10mV) VR102(1mV) Lower Side	on CRT 	V.MODE:CH1 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC VOLTS:10mV Apply square wave of 50mV. Adjust the amplitude to be 5-div. Change VOLTS 10mV to 1mV, and apply square wave of 5mV. Adjust the amplitude to be 5-div.
20)CH2 V.GAIN	X73-1760 VR504(10mV) VR202(1mV) Lower Side	on CRT 	V.MODE:CH2 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC VOLTS:10mV Apply square wave of 50mV. Adjust the amplitude to be 5-div. Change VOLTS 10mV to 1mV, and apply square wave of 5mV. Adjust the amplitude to be 5-div.

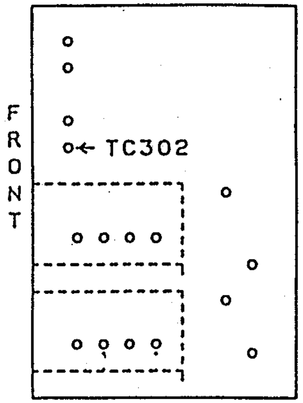
ITEM	ADJ.PART	TEST POINT	PROCEDURE
21)CH3 V.GAIN	VR507/X73-1760 on CRT Lower Side		V.MODE:CH3 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC VOLTS:0.1V Apply square wave of 0.5V. Adjust the amplitude to be 5-div.
22)CH4 V.GAIN	VR510/X73-1760 on CRT Lower Side		V.MODE:CH4 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC VOLTS:0.1V Apply square wave of 0.5V. Adjust the amplitude to be 5-div.

ITEM	ADJ.PART	TEST POINT	PROCEDURE
23)Waveform Shaping (CH1)	X75-1180 TC105(0.1V) TC103(1V) Lower Side	on CRT 	V.MODE:CH1 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC VOLTS:10mV Apply square wave of 1kHz to CH1 INPUT. Adjust the waveform to be shaped square for both 0.1V and 1V/DIV range. 
24)Waveform Shaping (CH2)	X75-1180 TC205(0.1V) TC203(1V) Lower Side	on CRT 	V.MODE:CH2 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC VOLTS:10mV Apply square wave of 1kHz to CH1 INPUT. Adjust the waveform to be shaped square for both 0.1V and 1V/DIV range. 

ITEM | ADJ.PART | TEST POINT | PROCEDURE

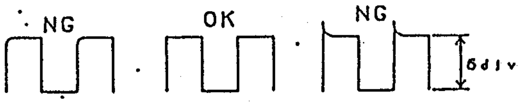
25)Waveform Shaping (CH3)

TC302/X75-1180 on CRT Lower Side



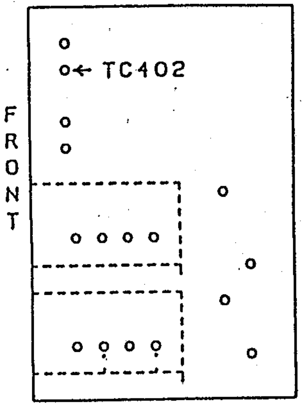
V.MODE:CH3 TRIG.SOURCE:VERT H.MODE:A
V.VARI:CAL AC-DC:DC 0.5V-0.1V:0.5V

Apply square wave of 1kHz to CH3 INPUT. Adjust the waveform to be shaped square for 0.5V range.



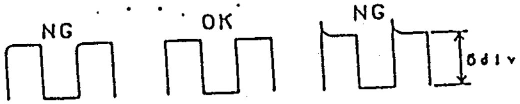
26)Waveform Shaping (CH4)

TC402/X75-1180 on CRT Lower Side

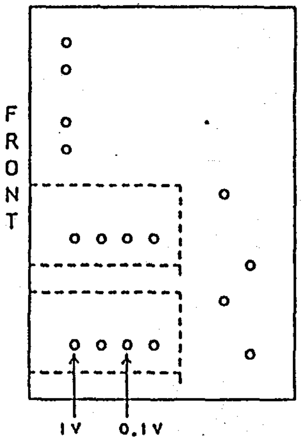
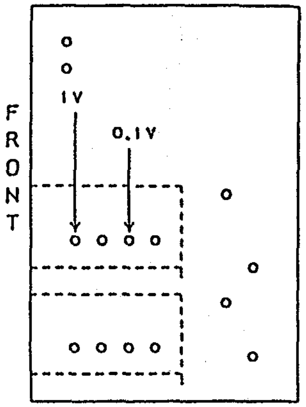


V.MODE:CH4 TRIG.SOURCE:VERT H.MODE:A
V.VARI:CAL AC-DC:DC 0.5V-0.1V:0.5V

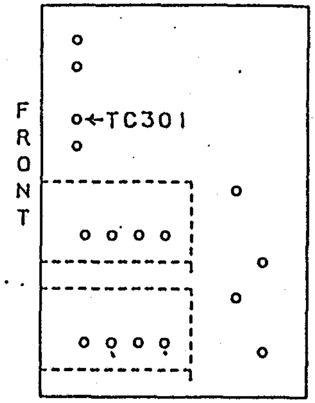
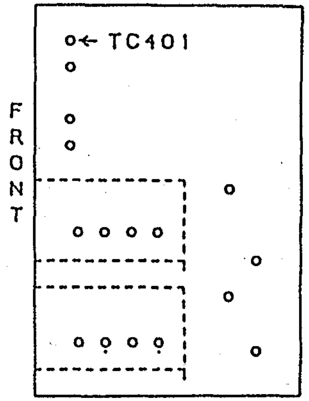
Apply square wave of 1kHz to CH4 INPUT. Adjust the waveform to be shaped square for 0.5V range.



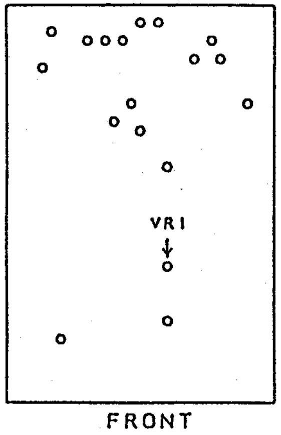
ADJUSTMENT

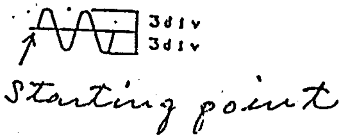
ITEM	ADJ.PART	TEST POINT	PROCEDURE
27)Input Capacity (CH1)	X75-1180 TC104(0.1V) TC102(1V) Lower Side	CH1 INPUT 	V.MODE:CH1 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC VOLTS:10mV Connect capacitance meter to CH1 INPUT. Confirm the indication of capacitance meter.(within 20pF +-3pF) Adjust the capacity at 0.1V and 1V to be same as 10mV's.
28)Input Capacity (CH2)	X75-1180 TC204(0.1V) TC202(1V) Lower Side	CH2 INPUT 	V.MODE:CH2 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC VOLTS:10mV Connect capacitance meter to CH2 INPUT. Confirm the indication of capacitance meter.(within 20pF +-3pF) Adjust the capacity at 0.1V and 1V to be same as 10mV's.

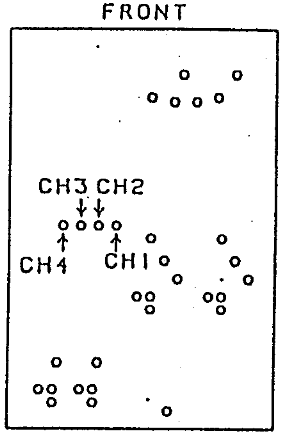
ADJUSTMENT

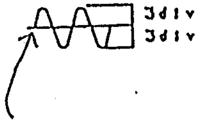
ITEM	ADJ.PART	TEST POINT	PROCEDURE
29)Input Capacity (CH3)	TC301/X75-1180 Lower Side	CH3 INPUT 	V.MODE:CH3 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC 0.5V-0.1V:0.1V Connect capacitance meter to CH3 INPUT. Confirm the indication of capacitance meter.(within 20pF +-3pF) Adjust the capacity at 0.5V to be same as 0.1V's.
30)Input Capacity (CH4)	TC401/X75-1180 Lower Side	CH4 INPUT 	V.MODE:CH4 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC 0.5V-0.1V:0.1V Connect capacitance meter to CH4 INPUT. Confirm the indication of capacitance meter.(within 20pF +-3pF) Adjust the capacity at 0.5V to be same as 0.1V's.

ITEM	ADJ.PART	TEST POINT	PROCEDURE
31)FIX Level	VR1/X74-1480 Upper Side	on CRT	V.MODE:CH1 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC VOLTS:0.1V SWEEP TIME:0.2ms Apply sine wave of 1kHz to CH1 to reach to 6-div. Adjust starting point of sine wave to be center of CRT when switch SLOPE between + and -.




3div
3div
Starting point

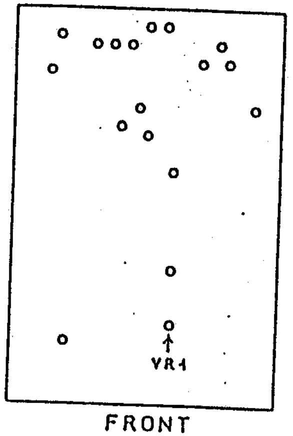
ITEM	ADJ.PART	TEST POINT	PROCEDURE
32)A.TRIG DC Coupling	X73-1760 VR601(CH1) VR602(CH2) VR603(CH3) VR604(CH4) Lower Side 	on CRT	*CH1 V.MODE:CH1 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC VOLTS:0.1V SWEEP TIME:0.2ms COUPLING:AC Apply sine wave of 1kHz to CH1 to reach to 6-div. Locate starting point of sine wave to be center of CRT by TRIG LEVEL. Adjust starting point of sine wave to be center of CRT when change COUPLING AC to DC. *CH2 Input:CH2 V.MODE:CH2 Another procedure is same manner as CH1. *CH3 Input:CH3 V.MODE:CH3 0.5V-0.1V:0.1V Another procedure is same manner as CH1. *CH4 Input:CH4 V.MODE:CH4 0.5V-0.1V:0.1V Another procedure is same manner as CH1.

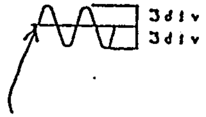


Starting point.

ADJUSTMENT

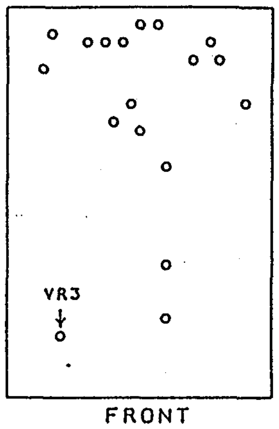
ITEM	ADJ.PART	TEST POINT	PROCEDURE
33)B.TRIG Level Center	VR4/X74-1480 Upper Side	on CRT	V.MODE:CH1 TRIG.SOURCE:VERT H.MODE:B AC-DC:DC VOLTS:0.1V SWEEP TIME:0.2ms B.COUP:AC B.LEVEL:Mechanical Center Apply sine wave of 1kHz to CH1 to reach to 6-div. Adjust starting point of sine wave to be center of CRT when switch SLOPE between + and -.

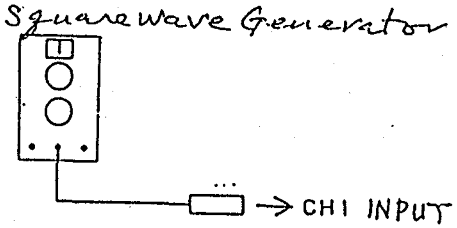


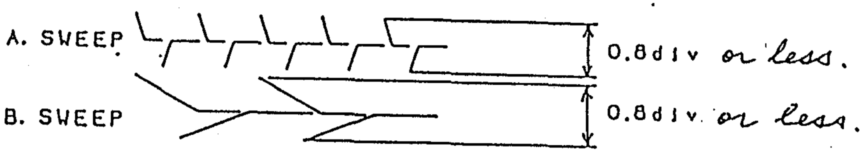


Starting point.

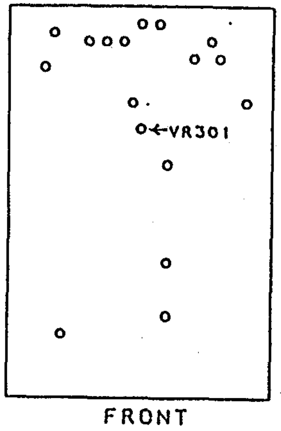
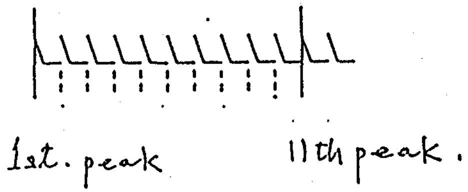
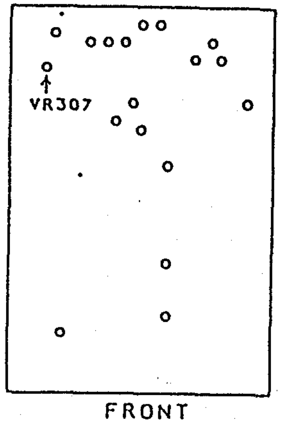
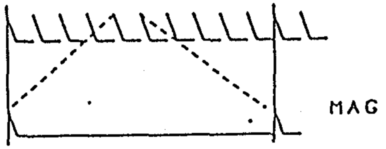
ITEM	ADJ.PART	TEST POINT	PROCEDURE
34)B.TV Sensitivity	VR3/X74-1480	on CRT	V.MODE:CH1 TRIG.SOURCE:VERT AC-DC:DC VOLTS:0.2V SWEEP TIME:A 10us B 5us H.MODE:ALT A.COUP:TV LINE Input square wave of 100kHz through jig to CH1. Adjust to be synchronized when change SLOPE +-. Adjust to be synchronized until decrease under 0.8div.



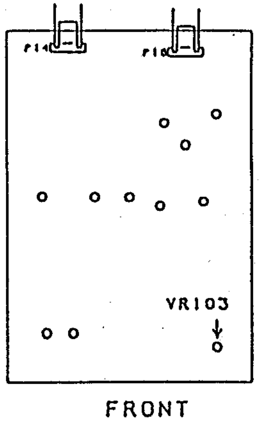
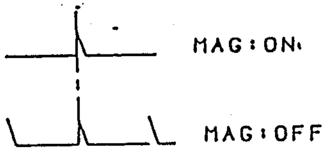
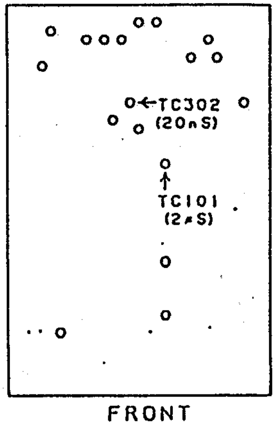

Squarewave Generator
CH1 INPUT

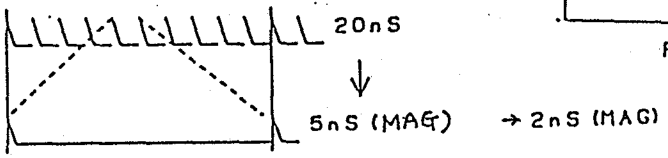
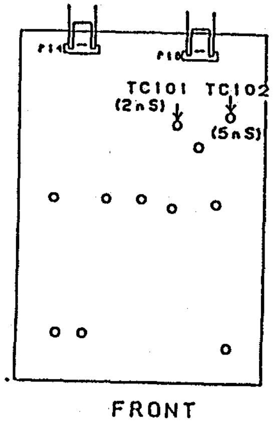
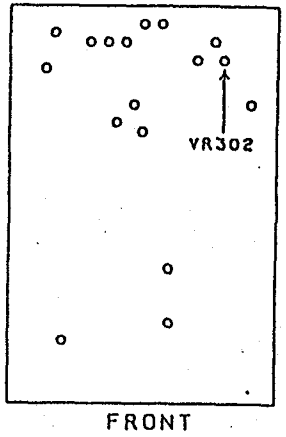
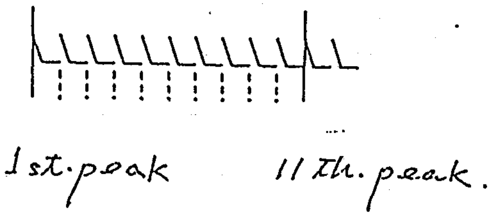

A. SWEEP
0.8div or less.
B. SWEEP
0.8div or less.

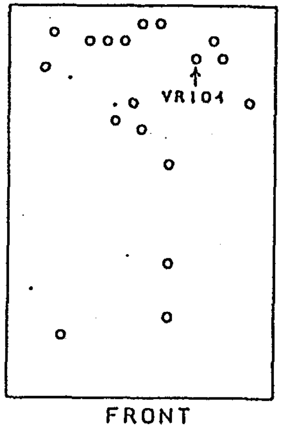
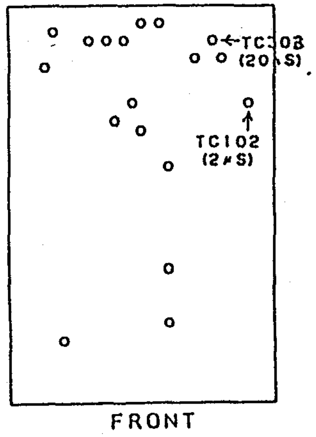
ADJUSTMENT

ITEM	ADJ.PART	TEST POINT	PROCEDURE
35)A.SWEEP TIME 1ms	VR301/X74-1480 Upper Side 	on CRT	H.MODE:A SWEEP TIME:1ms Apply marker-signal of 1ms. Adjust position of the marker-peaks to be on each div. of scales. 
36)MAG GAIN	VR307/X74-1480 Upper Side 	on CRT	H.MODE:A SWEEP TIME:1ms Apply marker-signal of 1ms. Locate position of the marker-peaks to be on each div. of scales. Turn X10 MAG on, and adjust interval of the marker-peaks to be just 10 divisions. 

ADJUSTMENT

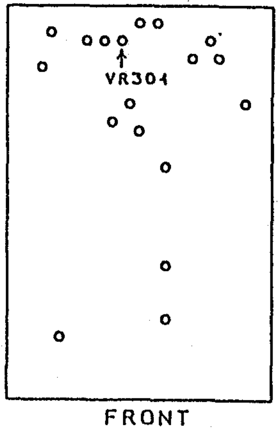
ITEM	ADJ.PART	TEST POINT	PROCEDURE
37)MAG Center	VR103/X80-1100 Upper Side	on CRT 	H.MODE:A SWEEP TIME:0.2us X10MAG:ON Apply marker-signal of 1us. Tune the marker-peak to be center of CRT-scale.(H.POSI) Turn X10 MAG off, and adjust the marker-peak to be center of CRT-scale. 
38)A.SWEEP TIME (2us & 20ns)	X74-1480 TC101(2us) TC302(20ns) Upper Side	on CRT 	H.MODE:A SWEEP TIME:2us Apply marker-signal of 2us. Adjust the marker-peaks to be on each div. of scales. Change SWEEP TIME 2us to 20ns, and adjust the marker-peaks as same manners as 2us's.

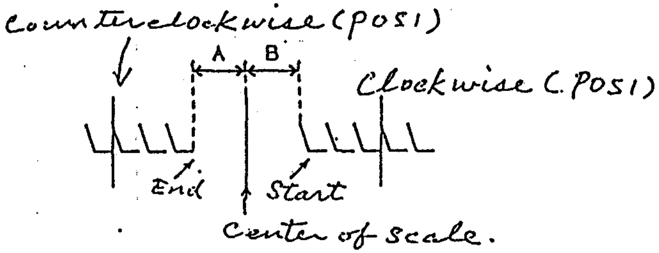
ITEM	ADJ.PART	TEST POINT	PROCEDURE
39)X10MAG (5ns & 2ns)  20nS 5nS (MAG) → 2nS (MAG)	X80-1100 TC102(5ns) TC101(2ns) Upper Side	on CRT  TC101 (2nS) TC102 (5nS) FRONT	H.MODE:A SWEEP TIME:50ns X10MAG:ON Apply marker-signal of 50ns. Adjust interval of the marker-peaks to be 10 divisions on scale. Change SWEEP TIME 50ns to 2ns, and adjust the marker-peaks as same manners as 50ns's. Adjust repeatedly as follow to get the optimum point. 20ns to 5ns(MAG) to 2ns(MAG)
40)B.SWEEP TIME 1ms	VR302/X74-1480 Upper Side	on CRT  VR302 FRONT	H.MODE:A A.SWEEP TIME:2ms after that change as follow H.MODE:B B.SWEEP TIME:1ms Apply marker-signal of 1ms. Adjust the marker-peaks to be on each div. of scale.  1st.peak 11th.peak.

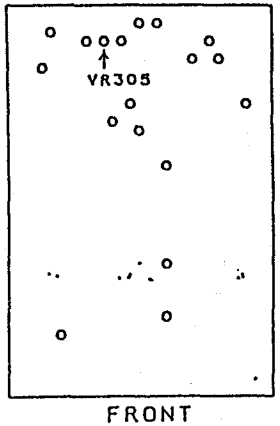
ITEM	ADJ.PART	TEST POINT	PROCEDURE
41)B.SWEEP TIME 1-5ms	VR104/X74-1480 Upper Side	on CRT  	H.MODE:A A.SWEEP TIME:10ms after that change as follow H.MODE:B B.SWEEP TIME:5ms Apply marker-signal of 5ms. Adjust the marker-peaks to be on each div. of scale. Change SWEEP TIME 5ms to 1ms, and confirm to do not vary the peaks. When it's varyed, readjust from 1ms.
42)A.SWEEP TIME (2us & 20ns)	X74-1480 TC102(2us) TC303(20ns) Upper Side	on CRT  	H.MODE:A A.SWEEP TIME:5us after that change as follow H.MODE:B B.SWEEP TIME:2us Apply marker-signal of 2us. Adjust the marker-peaks to be on each div. of scales. Change SWEEP TIME 2us to 20ns, and adjust the marker-peaks as same manners as 2us's.

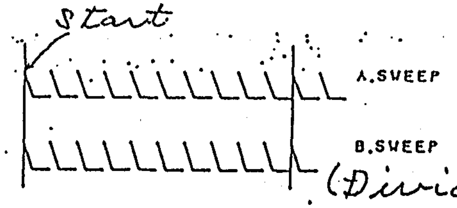
ADJUSTMENT

ITEM	ADJ.PART	TEST POINT	PROCEDURE
43)A.SWEEP POSITION	VR304/X74-1480 Upper Side	on CRT	H.MODE:A SWEEP TIME:1ms Apply marker-signal of 1ms. Adjust interval of starting and ending-point of marker-signals to be same.
44)B.SWEEP POSITION	VR305/X74-1480 Upper Side	on CRT	H.MODE:A A.SWEEP TIME:1ms after that change as follow H.MODE:ALT B.SWEEP TIME:1ms Apply marker-signal of 1ms. Adjust the marker-peaks to be laid so as to overlap waveform of A.SWEEP. Starting point of waveform of A.SWEEP and B.SWEEP should be syncronized.


VR304
FRONT

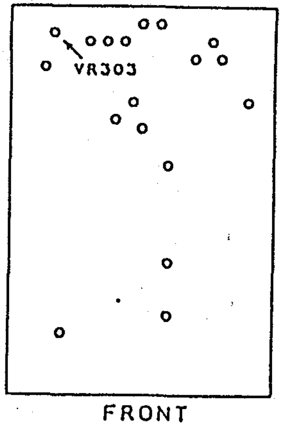
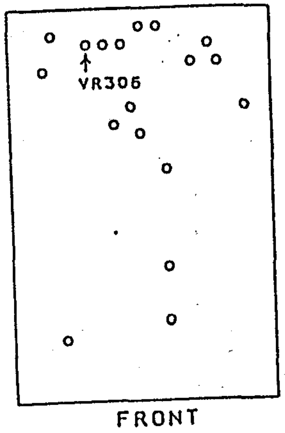
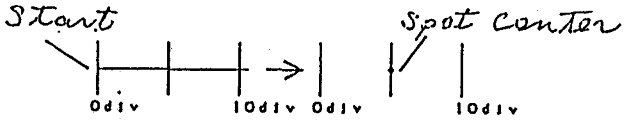

Counterclockwise (POSI)
A
B
Clockwise (POSI)
End
Start
Center of scale.


VR305
FRONT

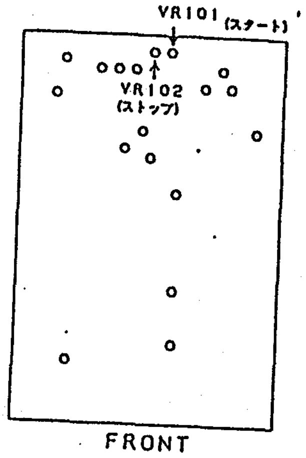
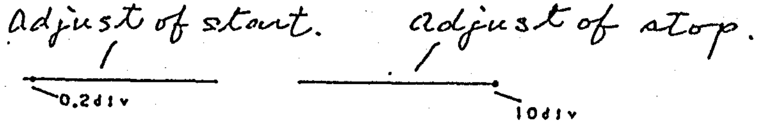
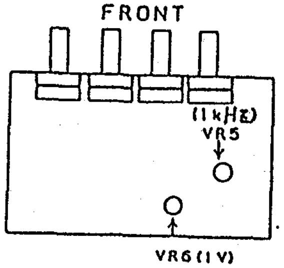
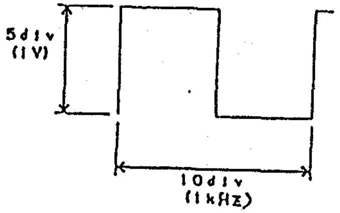

Start
A.SWEEP
B.SWEEP

(Dividing condition of B.SWEEP in TRACE SEP)

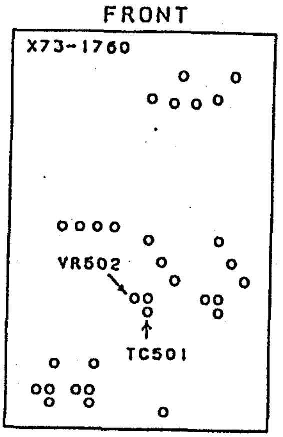
ADJUSTMENT

ITEM	ADJ.PART	TEST POINT	PROCEDURE
45)X.Gain	VR303/X74-1480 on CRT Upper Side	 VR303 FRONT	H.MODE:X-Y CH2.AC-DC:AC V.VARI:CAL CH2.VOLTS:10mV Input square wave of 50mV. Adjust the amplitude to expand over 5 division.
46)X.Position	VR306/X74-1480 on CRT Upper Side	 VR306 FRONT	V.MODE:CH1 TRIG.SOURCE:CH1 H.MODE:A AC-DC:GND(Both CH) SWEEP TIME:1ms Set starting point of luminance-line at 0div of X-axis. Change H.MODE to X-Y. Adjust location of luminance-spot to come to the center.  Start Spot center 0div 10div 0div 10div

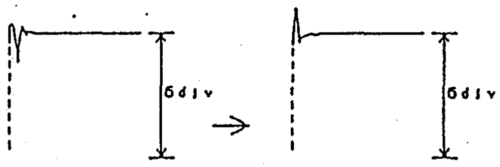
ADJUSTMENT

ITEM	ADJ.PART	TEST POINT	PROCEDURE
47)DELAY TIME POSITION	X74-1480 VR101(Start) VR102(Stop) Upper Side	on CRT  VR101 (スタート) VR102 (ストップ) FRONT	H.MODE:ALT AC-DC:GND(Both CH) A.SWEEP TIME:1ms B.SWEEP TIME:0.2us Set DELAY TIME POSI to appear indication of CRT as 0.20. Adjust B.SWEEP to 0.2div(start). Set DELAY TIME POSI to appear indication of CRT as 10.0. Adjust B.SWEEP to 10div(stop).  Adjust of start. adjust of stop. 0.2div 10div
48)CAL	X81-2330 VR5(1kHz) VR6(1V) Upper Side	on CRT  FRONT (1kHz) VR5 VR6(1V)	Connect oscilloscope and freq. counter CAL-terminal, and adjust as follow.  5div (1V) 10div (1kHz)

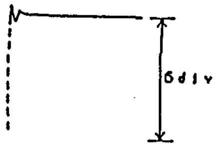
ADJUSTMENT

ITEM	ADJ.PART	TEST POINT	PROCEDURE
49)CH1 Square Wave	X73-1760 Bottom Side X80-1100 Upper Side X75-1180 Bottom Side	on CRT  FRONT X73-1760 VR502 TC501	V.MODE:CH1 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC(Both CH) VOLTS:10mV(Both CH) 1)Rotate VR and TC as per attached sheet. 2)Apply square wave of 1MHz to CH1 INPUT. 3)Adjust TC501/X73-1760 to increase the high range. 4)Adjust VR502/X73-1760 to decrease the overshoot. 5)Adjust waveform as follow to repeat 3) and 4). upper 0.1div lower 0.2div

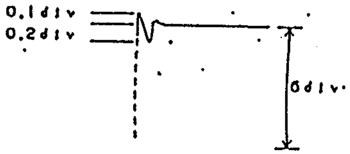
3)



4)

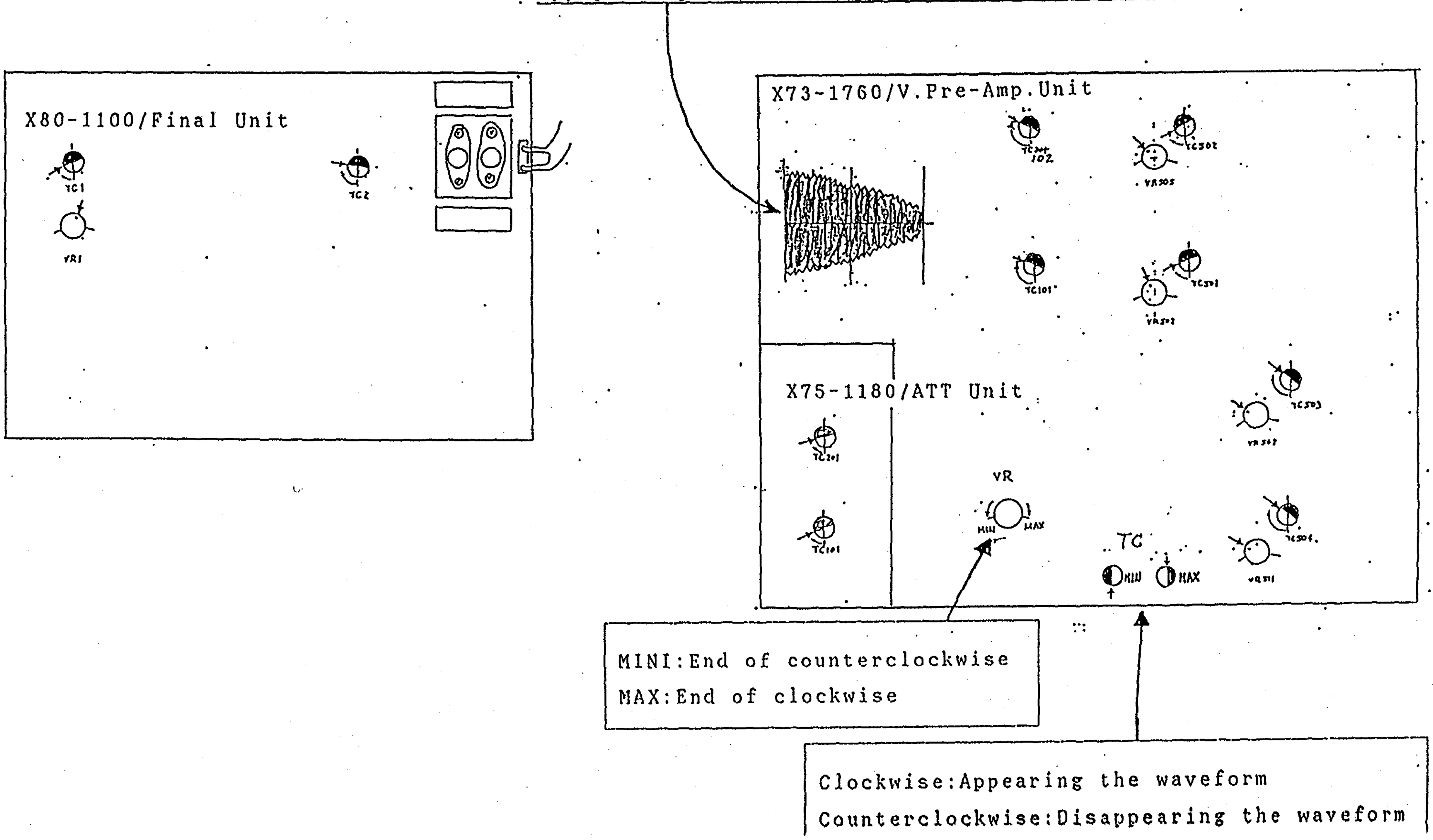


5)


0.1div
0.2div
6div

Positioning for VR and TC :

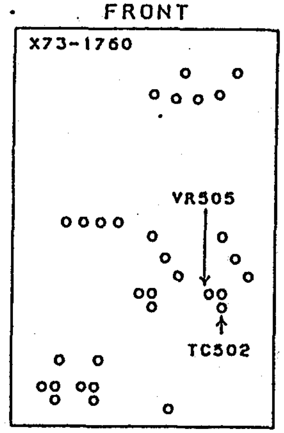
Apply sweep-signal to CH1, and shape the waveform as this.


X80-1100/Final Unit
TC1
VR1
TC2
X73-1760/V.Pre-Amp.Unit
TC102
TC502
TC101
TC501
TC503
TC504
X75-1180/ATT Unit
TC201
TC101
VR
MIN
MAX
TC
MIN
MAX

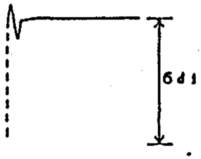
MINI:End of counterclockwise
MAX:End of clockwise

Clockwise:Appearing the waveform
Counterclockwise:Disappearing the waveform

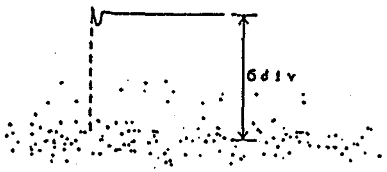
ADJUSTMENT

ITEM	ADJ.PART	TEST POINT	PROCEDURE
50)CH2 Square Wave	X73-1760 Bottom Side  FRONT X73-1760 VR505 TC502	on CRT	V.MODE:CH2 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC(Both CH) VOLTS:10mV(Both CH) 1)Apply square wave of 1MHz to CH2 INPUT. 2)Adjust VR505/X73-1760 to balance the overshoot. 3)Adjust TC502/X73-1760 to increase the high-range. 4)Adjust waveform as follow to repeat 2) and 3). upper 0.1div lower 0.2div

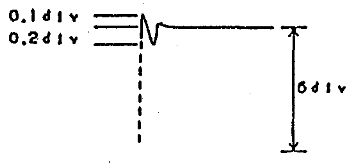
2)



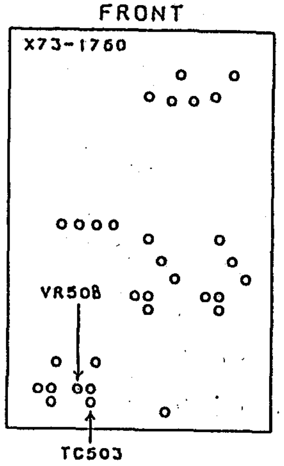
3)



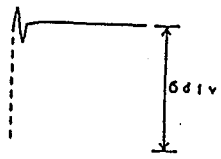
4)


0.1div
0.2div
6div

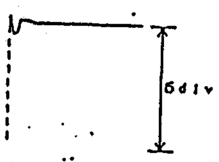
ADJUSTMENT

ITEM	ADJ.PART	TEST POINT	PROCEDURE
51)CH3 Square Wave	X73-1760 Bottom Side  FRONT X73-1760 VR508 TC503	on CRT	V.MODE:CH3 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC(Both CH) VOLTS:10mV(Both CH) 1)Apply square wave of 1MHz to CH2 INPUT. 2)Adjust VR506/X73-1760 to balance the overshoot. 3)Adjust TC503/X73-1760 to increase the high-range. 4)Adjust waveform as follow to repeat 2) and 3). upper 0.1div lower 0.2div

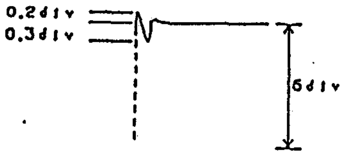
2)



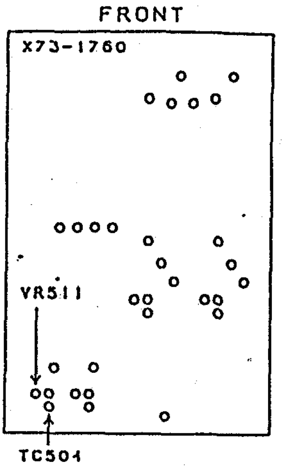
3)



4)


0.2div
0.3div
5div

ITEM	ADJ.PART	TEST POINT	PROCEDURE
52)CH4 Square Wave	X73-1760 Bottom Side	on CRT	V.MODE:CH4 TRIG.SOURCE:VERT H.MODE:A V.VARI:CAL AC-DC:DC(Both CH) VOLTS:10mV(Both CH)


FRONT
X73-1760
VR511
TC504

1)Apply square wave of 1MHz to CH2 INPUT.

2)Adjust VR511/X73-1760 to balance the overshoot.

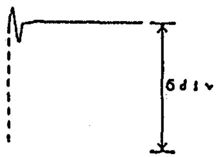
3)Adjust TC504/X73-1760 to increase the high-range.

4)Adjust waveform as follow to repeat 2) and 3).

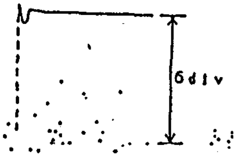
upper 0.1div

lower 0.2div

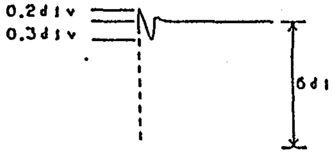
2)



3)



4)


0.2div
0.3div
6div

ITEM	ADJ.PART	TEST POINT	PROCEDURE
53)Frequency Response		on CRT	VOLTS:10mV(CH1,CH2) VOLTS:0.1V(CH3,CH4) 1)Apply sine-wave of 50kHz with the amplitude extending over 6 div. 2)Confirm difference between 50kHz and 150MHz to be more than 4.3div.
54)Setting of READOUT CALENDAR and CLOCK			1)Push H.MODE A and X-Y at the same time. 2)Push H.MODE AINTB(A-B) within 5 seconds. 3)Rotate SWEEP TIME/DIV control to set a proper month. 4)Pushing H.MODE X-Y shifts the flashing position to the right.The second digit of the "Day" of the display now flashes. 5)Set the second digit of the "Day" by rotating the SWEEP TIME/DIV control. 6)Repeat operations 4) and 5) to set proper values to the first digit of the "Minute". 7)On complition of setting up to the first digit of the "Minute",push X-Y again.